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COMMERCIAL FISHERIES REVIEW

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COMMERCIAL FISHERIES REVIEW

A REVIEW OF DEVELOPMENTS AND NEWS OF THE FISHERY INDUSTRIES
PREPARED IN THE DIVISION OF COMMERCIAL FISHERIES

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COMMERCIAL FISHERIES REVIEW

July 1947 Washington 25, D.C. Vol. 9, No.7

NUTRITIVE VALUE FOR GROWTH OF SOME FISH PROTEINS

By H. W. Nilson,* W. A. Martinek,* and B. Jacobs*

ABSTRACT

Feeding studies were conducted with growing rats to determine the approximate nutritive value of proteins extracted with acetone from the edible flesh of 17 species of fish. No statistically significant differences were found in the gain in weight of groups of rats fed the various proteins. It is concluded that all proteins tested are of good nutritive quality, especially so far as balancing the average diet is concerned. The proteins tested were also found to be well digested.

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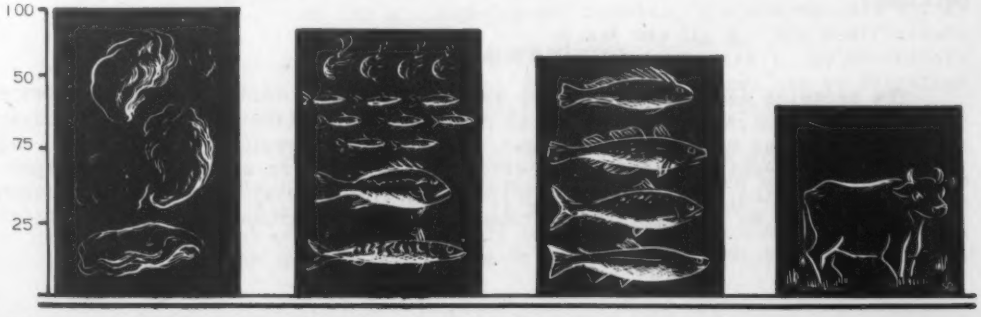
INTRODUCTION

Comparatively few studies have been conducted to determine the nutritive value of proteins derived from fishery sources. Lanham and Lemon (1938) reviewed the literature and found that, in general, earlier investigators had rated proteins from fishery sources about equal to that of beef. Lanham and Lemon also reported experimental work on feeding studies with growing rats, using protein obtained by extraction with acetone of the edible flesh of certain fishery products. The proteins could be classified into the following groups based on comparative gain in live weight estimated from equal protein intake. If the protein of oysters is arbitrarily rated 100; the proteins of pilchard, red snapper, shrimp, and Boston mackerel rated about 90; those of shad, cod, croaker, and coho salmon rated about 80; and that of beef rated 63. These comparative values indicate that the proteins of the several fishery products are of somewhat higher quality than beef.

Another index for determining the comparative nutritive value of proteins depends on assaying the metabolic use of the proteins, instead of measuring the



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growth of animals fed a limited quantity of protein. This index of nutritive value is designated "biological value" of a protein. It is determined by feeding adult male rats (biological value for maintenance) on a protein free diet and determining excretion of protein in urine and feces. The test protein is then fed in limited quantity and the excretion is determined. The index of biological value is calculated from the formula: food nitrogen intake minus (fecal nitrogen when protein was fed minus fecal nitrogen when protein free diet was fed) minus (urinary nitrogen when protein was fed minus urinary nitrogen when protein free diet was fed) divided by food nitrogen intake minus (urinary nitrogen when protein was fed minus urinary nitrogen when protein free diet was fed). The answer is multiplied by 100 to give comparative values having 100 as the value of the highest quality protein.

Lanham, Lee, and Nilson (1940) reported that the biological value of the protein from similarly prepared flesh of Dungeness, king, and blue crabs, ranged from 68.9 to 78.3, while that of beef round equaled 70.2. They concluded that the data showed the biological value of the protein of crab meat equals or is slightly superior to that of beef round. The corrected digestibility values of the proteins were found to range from 85.6 to 93.3 percent on a scale in which 100 percent equals perfect digestion. These data indicate very satisfactory digestibility. Unpublished preliminary data from this laboratory show that the biological value of the protein prepared by acetone extraction of oysters is about 95.4. These data apparently confirm the feeding studies with rats as to the very good nutritive value of oysters.

In some respects, it would have been very desirable to gather more data on the biological value of proteins from other fishery products, but the many chemical analyses required did not permit doing this type of assay with the staff available. It was decided, therefore, to conduct further feeding tests with growing rats to determine the comparative nutritive value of the proteins previously prepared for amino acid studies reported by Pottinger and Baldwin (1939). These proteins were also of the same series as those used in the rat feeding experiments reported by Lanham and Lemon (1938).

There was a second consideration which dictated choice of experimental method; namely, less concern was felt for determining the "true" nutritive values of these proteins, than to get an estimate of probable "balancing" values in the diet. The diet fed to the rats contained 9.0 percent protein derived from fish flesh, and 1.2 percent from supplementary sources such as liver extract, dried yeast, wheat germ, and corn starch. The supplementary proteins amounted to about 12 percent of the total protein content.

These tests were begun after the war started in order to have available on request, data on the comparative nutritive value of fish proteins. The data have been reported to interested government agencies, but have not been previously published.

EXPERIMENTAL METHODS

The proteins used in these studies were prepared by covering the ground edible flesh with acetone, and permitting it to remain in this solvent for about 10 hours. This procedure was repeated three times. The resulting residue was reground, and continuously extracted with fresh acetone for 14 hours in an extractor designed by Lemon, Griffiths, and Stansby (1936). The solid material was dried on a steam bath in open air to vaporize the acetone. It was then ground in a Wiley mill to

a light, dry meal which could be stored indefinitely in sealed Mason jars. The crude protein content varied from 86 to 97 percent, as reported in Table 1.

Table 1 - Source and Crude Protein Content of the Acetone Extracted Fish Flesh

Source of Protein	Crude Protein (N x 6.25)	Source of Protein	Crude Protein (N x 6.25)
	Percent		Percent
Beef round	91.28	Salmon (Continued):	
Bonito (Sarda chiliensis)	93.19	Coho (O. kisutch)	94.44
Catfish (Ictaturus punctatus) ..	85.50	Pink (O. gorbuscha)	95.28
Halibut (Hippoglossus hippoglossus)	88.94	Sockeye (O. nerka)	93.13
Herring:		Squeteague (Cynoscion regalis).	87.81
Lake (Leucichthys artedi)	87.68	Trout, lake (Cristivomer namaycush)	93.31
Sea (Clupea harengus)	86.01	Tuna:	
Mullet (Mugil species)	90.87	Albacore (Germo alalunga) ...	95.75
Salmon:		Bluefin (Thynnus thynnus) ...	94.50
Chinook (Oncorhynchus tschawytscha)	93.38	Skipjack (Katsuwonus pelamis)	96.50
Chum (O. keta)	95.35	Yellowfin (Neothunnus macropterus)	96.63

Lanham and Lemon (1938) showed that the protein of acetone extracted haddock flesh had approximately the same nutritive value as unextracted flesh that was dried on a steam bath, and the apparent digestibility was similar. The rats fed the treated protein grew about as well as rats from the same colony in other experiments, which were fed a similar basal diet ad libitum, but were fed cooked fish in a separate feed cup daily in such quantity that the total protein intakes over the experimental period were equal. There is no reason for believing that the nutritive value of the extracted proteins used was significantly altered either by extraction or prolonged storage.

The diets consisted of enough acetone extracted fish flesh to provide 9 parts crude protein; lard, 8; cod liver oil, 2; salt mixture U.S.P. XI, No. 2, 4; dried brewer's yeast, 2; wheat embryo, 1; liver extract (Lilly), 0.5; and corn starch to make 100 parts by weight. These diets were made up at not more than bi-weekly intervals, and stored in a refrigerator.

The rats were allotted at an initial live weight of 49 to 57 g., into groups of from 10 to 22 animals, using both sexes. The animals were not all allotted at the same time, but in each series, a number of rats adequate to furnish control data were fed the diet containing beef protein. All rats were individually housed in wire screen cages fitted on wire mesh floors. The temperature of the room was maintained at 80° F. They were supplied with food and water ad libitum, and weekly records were taken on live weight and food consumption.

EXPERIMENTAL DATA

The data in Table 2 (see p. 4) show that the average gain in live weight for all groups of males equaled 163 g., and for all females, the average was 130 g. The mean gain for the 18 groups, including both sexes, was 144 g. The coefficients of variability for sub-group and group weights (Table 3, see p. 4) are within expected limits for this type of experiment, and the higher values can be explained by the very poor, or very exceptional, growth of a few individuals.

At first glance, the data would seem to indicate that practically all of the rats fed the proteins from fishery products gained more weight than those fed the protein from beef round. This is not true, however, when recognition is given to the effect of variation in food intake (see Tables 4 and 5, p. 5). Food intake was used rather than protein intake to adjust gain in weight. The two com-

ponents are found in exactly the same ratio in all diets, but the absolute quantity of food intake varied more than the quantity of protein intake. It is more likely that variations in gain in weight are due to quality rather than quantity

Table 2 - Mean and Estimated Gain in Weight of Rats Fed for a 10-Week Period with Diets Containing 9 Percent of Protein from Fishery Products

Source of Protein	Number		Mean gain in weight			Estimated mean gain for group on basis of equal food intake
	Males	Females	Males	Females	Group	
			Grams	Grams	Grams	Grams
Beef round	12	10	136.3	121.8	129.7	146.2
Bonito	4	6	166.0	141.7	151.4	141.5
Catfish	4	6	190.8	117.3	146.7	150.7
Halibut	4	6	144.2	136.2	139.4	147.1
Herring:						
Lake	7	4	152.7	113.5	138.5	152.7
Sea	6	4	183.7	130.3	162.3	163.2
Mullet	4	6	183.5	123.5	147.5	151.3
Salmon:						
Chinook	6	9	147.5	110.3	125.2	139.3
Chum	4	6	180.3	142.7	157.7	146.0
Coho	5	7	135.8	123.6	128.7	140.3
Pink	4	6	174.5	127.0	146.0	142.1
Sockeye	4	6	170.5	130.7	146.6	150.6
Squeteague	4	6	133.3	113.7	121.5	139.9
Trout, lake	4	6	177.0	126.7	146.8	133.5
Tuna:						
Albacore	3	7	150.0	154.0	152.8	138.2
Bluefin	4	6	186.0	150.5	164.7	142.2
Skipjack	4	6	154.3	149.3	151.3	134.8
Yellowfin	4	6	164.8	129.5	143.6	140.6
		Mean	162.8	130.1	144.5	144.5

differences in proteins after eliminating the effect of variations in food intake. The statistical analyses show clearly that there was no difference in the response of the two sexes to the experimental variables.

Table 3 - Statistical Analysis of Mean Gain in Weight of Rats for the 10-Week Period as Recorded in Table 1

Source of Protein	Coefficient of variation			Source of Protein	Coefficient of variation		
	Males	Females	Group		Males	Females	Group
	Percent	Percent	Percent		Percent	Percent	Percent
Beef round	23	16	21	Salmon (Cont.)			
Bonito	18	7	15	Coho	20	27	24
Catfish	15	20	30[1]	Pink	10	13	6
Halibut	11	15	13	Sockeye	10	8	16
Herring:				Squeteague	10	17	16
Lake	17	32[2]	25	Trout, lake	24	10	25
Sea	13	6	21[3]	Tuna:			
Mullet	18	13	26	Albacore	32[4]	16	20
Salmon:				Bluefin	17	14	18
Chinook	21	20	25	Skipjack	25	22	22
Chum	14	16	19	Yellowfin	17	15	20

1/One male grew very well, and two females grew poorly. 3/Three males grew very well.
2/One female grew very poorly. 4/One male grew very poorly.

The standard error of difference between adjusted mean group gains in weight equals 28.96 g., and a difference to equal the 5 percent level of significance for 180 degrees of freedom is 57.1 g. (Table 5). It will be noted in Table 2 that the greatest difference in original data for mean gain in weight for groups is 43.2 g. (164.7 - 121.5 g.), and for estimated mean gain in weight it is 29.7 g.

(163.2 - 133.5 g.). This means that all of the proteins studied had about the same nutritive value in these feeding tests.

Table 4 - Mean Food Intake of Rats Fed for a 10-Week Period with Diets Containing 9 Percent of Protein from Fishery Products

Source of Protein	Mean Food Intake			Source of Protein	Mean Food Intake		
	Males	Females	Group		Males	Females	Group
	Grams	Grams	Grams		Grams	Grams	Grams
Beef round	620.6	622.6	621.5	Salmon (Cont.):			
Bonito	721.3	731.0	727.1	Coho	631.4	697.8	641.0
Catfish	766.5	608.2	671.5	Pink	739.5	679.0	703.2
Halibut	633.0	672.0	656.4	Sockeye	701.8	651.2	671.4
Herring:				Squeteague	601.5	622.0	613.8
Lake	665.3	569.8	630.5	Trout, lake	795.5	704.2	740.7
Sea	739.3	600.8	683.9	Tuna:			
Mullet	741.3	626.7	672.5	Albacore	704.7	764.0	746.2
Salmon:				Bluefin	815.0	752.7	777.6
Chinook	660.2	612.0	631.3	Skipjack	729.8	769.3	753.5
Chum	775.5	706.8	734.3	Yellowfin	731.5	678.3	699.6
				Mean	709.7	670.5	687.6

The data in Table 6 on grams gain in live weight per gram of protein consumed, particularly for group means, show about the same degree of variation and

Table 5 - Analysis of Variance for Food Intake and Gain in Weight

	Source of Variation		
	Groups	Sex	Residue
Degree of freedom	17	1	180
Sum of squares:			
Gain in weight	29,755	44,999	74,845
Food intake	498,072	45,479	1,512,420
Product of gain in weight and food intake	103,063	45,238	377,825
Adjusted sums of squares	200,364.56	0.72	829,935.81
Adjusted mean squares	11,786.15	0.72	4,610.75
Adjusted standard deviation	108.564	0.849	67.903

Standard error of difference = $\frac{67.903}{\sqrt{11}} \times \sqrt{2} = 28.96$ grams

Difference in group mean gain in weight to equal 5 percent level = 57.1 grams

Largest difference in original data = 43.2 "

Largest difference in estimated data = 29.7 "

Note: Method of Titus and Hammond, 1935.

trend as do the data on adjusted gain in weight as reported in Table 2. The rats fed the protein prepared from sea herring apparently made the most efficient gain

Table 6 - Total Protein Required for Gain in Weight

Source of Protein	Gain Per Gram Protein			Source of Protein	Gain Per Gram Protein		
	Males	Females	Group		Males	Females	Group
	Grams	Grams	Grams		Grams	Grams	Grams
Beef round	2.14	1.91	2.04	Salmon (Cont.):			
Bonito	2.25	1.90	2.04	Coho	2.10	1.87	1.97
Catfish	2.44	1.88	2.10	Pink	2.33	1.84	2.03
Halibut	2.26	1.98	2.09	Sockeye	2.39	1.98	2.14
Herring:				Squeteague	2.17	1.79	1.94
Lake	2.24	1.93	2.13	Trout, lake	2.17	1.76	1.93
Sea	2.43	2.14	2.31	Tuna:			
Mullet	2.42	1.93	2.13	Albacore	2.06	1.97	2.00
Salmon:				Bluefin	2.23	1.97	2.07
Chinook	2.19	1.77	1.94	Skipjack	2.07	1.89	1.96
Chum	2.28	1.97	2.10	Yellowfin	2.20	1.87	2.00
				Mean	2.24	1.91	2.05

in weight of the series. Three of the male rats grew very well, and the female rats made consistent and uniformly high gains in live weight.

The apparent digestibility of the total protein in the diet was determined by collecting feces during one week of the experimental period for rats selected at random (Table 7). Paper towels were spread under the cages and the feces were collected every day or two during the interval of the fourth to tenth week on experiment, and there was no evidence that the apparent digestibility varied with age of rat.

Table 7 - The Apparent Digestibility of Total Protein for Individual Rats During a 1 Week Period

Source of Protein	APPARENT DIGESTIBILITY IN PERCENT	
	Individual rats	Mean
Beef round	90.2, 86.1, 86.7, 90.5, 88.1, 93.2, 86.4, 87.5, 87.7, 88.3	88.5
Bonito	89.9, 89.4	89.7
Catfish	91.0, 87.8, 93.3, 90.3	90.6
Halibut	87.4, 86.5, 89.7, 90.6	88.6
Herring:		
Lake	91.1, 96.5, 97.8, 98.0, 97.4	96.2
Sea	89.0, 91.6, 88.2, 89.4	89.6
Mullet	88.7, 87.8, 88.3, 86.1	87.7
Salmon:		
Chinook	89.4, 90.9, 92.5, 92.4	91.3
Chum	88.4, 89.2, 88.4	88.7
Coho	90.8, 89.1, 90.7	90.2
Pink	89.2, 85.2, 90.7	88.4
Sockeye	87.6, 87.3, 91.3	88.7
Squeteague	92.0, 92.3, 90.4	91.6
Trout, lake	88.7, 90.9, 87.9, 89.6, 90.9	89.6
Tuna:		
Albacore	89.5, 90.5, 90.2, 89.9	90.0
Bluefin	89.0, 90.7	89.9
Skipjack	88.7, 87.1, 89.3	88.4
Yellowfin	90.1, 91.5, 90.4	90.7
	Mean	89.9

Very little variation in apparent digestibility is noted. The highest mean value is 7 percent, and the lowest value is only 2.4 percent under a "mean" apparent digestibility value for all groups. All of the proteins were well digested.

DISCUSSION

The experimental data indicate that the 18 proteins fed were about equally valuable in promoting growth at the 9 percent level in the diet. Lanham and Lemon (1938), on the other hand, found a difference in the nutritive value of the proteins which they fed at the same level, and concluded that those of fishery products were superior to that of beef round by 1.3 to 1.6 times. It will be noted that the rats used in their tests did not grow as well as those used in this study. The 12 rats of their control group fed beef, gained an average of 95.2 g. during the 10-week period as compared with 22 rats of the present series gaining an average of 129.7 g. Eleven rats fed protein from coho salmon gained 104.4 g. compared with 12 rats gaining an average of 128.7 g. in this study.

There are several possible explanations for these differences. First, the rats used in the earlier investigation were housed in a building that did not have very efficient control of temperature, and they may have been chilled or too warm at times. An environmental temperature of 80° F. was maintained during the test

period for the experiments reported herein. Secondly, the vitamin supplementation consisting of a commercial vitamin concentrate from milk, and an alcoholic extract of wheat embryo may not have been as complete in quantity or quality as the combination used in this instance. Also, the basal diet used previously contained 0.68 percent protein as compared with 1.2 percent protein in the latter series of experiments.

It is unlikely that the protein from the small quantity of liver extract, wheat embryo, and yeast in the diet would be responsible for the non-significant differences in gain in weight found in these data. There are appreciable but not statistically significant differences between groups which can most logically be attributed to varying quality of the fishery proteins. These differences may have been greater if the diet contained no supplementary protein. The supplementary proteins undoubtedly exert some balancing effect, but probably no more than that furnished by the protein of the average American diet. The data do show that the proteins of the fishery products tested are at least equal to beef in nutritive value.

SUMMARY

1. The proteins from 17 species of fish which were tested were found to be about equal in nutritive value when included in a diet containing some supplementary protein.

2. The nutritive value of these proteins was found to be about equal to that of the protein of beef.

3. The proteins were well digested, having an apparent digestibility of about 90 percent.

LITERATURE CITED

LANHAM, WILLIAM B., JR., and LEMON, JAMES M.

1938. Nutritional value for growth of some proteins of fishery products. Food Research. 3 (5): 549-553.

LANHAM, WILLIAM B., JR.; LEE, CHARLES F.; and NILSON, HUGO W.

1940. A study on the nutritive value of crab meat. Fishery Market News. 2 (10): 26-27.

LEMON, J. M.; GRIFFITHS, F. P.; and STANSBY, M. E.

1936. Metal extractor for laboratory use. Ind. Eng. Chem. Anal. Ed. 8: 462.

POTTINGER, S. R., and BALDWIN, W. H.

1939. The content of certain amino acids in the edible portions of fishery products. Proceedings Sixth Pacific Science Conference, Oceanography and Marine Biology. pp. 435-459.

FLUCTUATIONS IN FISH PRODUCTION IN THE U.S. & ALASKA

By Walter H. Stolting *

On various occasions during the past several years, the Fish and Wildlife Service has been approached by governmental agencies and by private individuals with requests for information on seasonal variations in fish production. For example, the U. S. Employment Service was interested in finding ways and means of relieving temporary manpower surpluses in certain areas by transferring workers from these areas to manpower deficiency areas. It wanted especially to know whether fish-producing centers would be able to absorb unemployed persons from other areas and at what times during the year they could be employed. On the other hand, during the winter of 1945-46, due to releases from the armed forces, some fishing areas had a surplus of manpower, and in these cases the U.S. Employment Service was interested in knowing how long these surpluses would be available for other employment.

The U.S. Public Health Service was interested in forecasting future hospitalization needs. It wanted to know how employment varies in the different fishing areas in order to adjust adequately the services offered in marine hospitals located in or near the respective areas.

Veterans released from the armed forces and seeking information on possible future fishery activities also were interested in knowing of peaks and lows in fish production.

After having answered several specific requests of the nature outlined, it was felt that it would be preferable to have on hand comprehensive data on this subject rather than to resort to individual investigations for each specific case. Consequently, a detailed study was undertaken of the principal fisheries throughout the United States and Alaska. The following discussion is a result of this study.

The time of the year when fish are caught in abundance, or when fishery products are manufactured to the greatest extent, is determined for most areas by two factors:

(a) biological habits of the respective fish; and
(b) climatic conditions conducive to the operation of fishing vessels.

These two conditions are the principal causes of production peaks and lows that vary from one fishing area to another. Legal restrictions on fishing and economic factors should be mentioned as other causes. The study, which in most cases refers to average monthly production figures based on data for the years 1943, 1944, and 1945, reveals that there are three types of variations in yearly fish production cycles:

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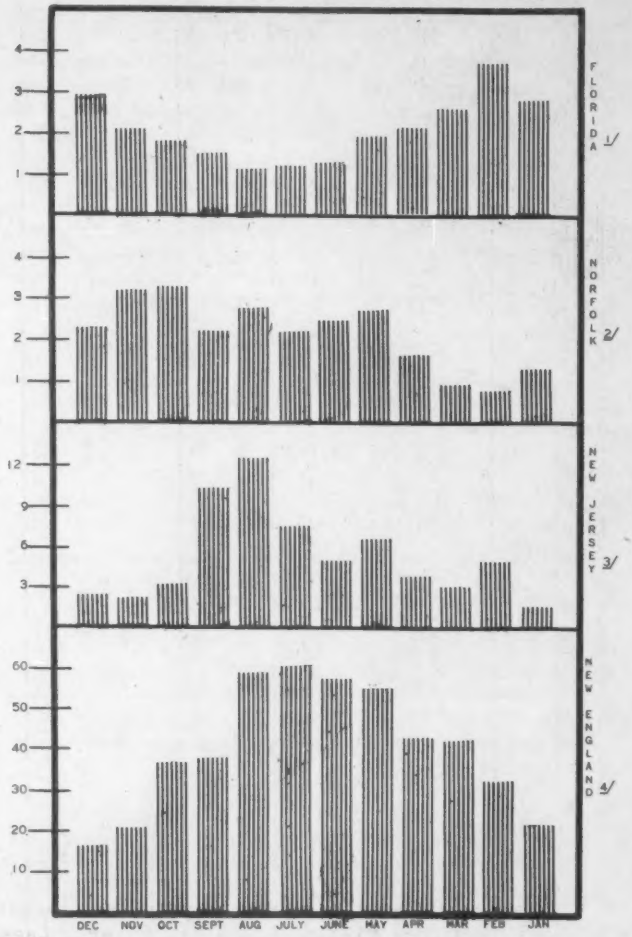
NOTE: The author wishes to acknowledge the helpful counsel of Dr. R. A. Kahn, Chief of the Economics and Cooperative Marketing Section.

(a) variations between different areas;
(b) variations within one specific area between different species of fish and shellfish; and
(c) accelerated variations for individual species, showing double peaks and double lows for a given period.

An example of the first type of variation (between different areas) may be found in the variations occurring in the South Atlantic as compared with the Middle Atlantic and North Atlantic areas. Table 1 (items 1, 2, 4, 5, and 8) (see p. 10) and Figure 1 show that fish in the Florida waters are abundant in the winter, while in the Middle Atlantic, fish are abundant in the early spring, and in the New England waters, in the latter part of spring and in early summer months.

FIGURE 1 - MONTHLY LANDINGS OF FISH IN SELECTED AREAS OF THE ATLANTIC SEABOARD FOR SPECIFIED PERIODS (IN MILLIONS OF POUNDS)



1/PRODUCTION--CERTAIN AREAS OF FLORIDA - 7/41-6/42
2/NORFOLK, VA. AREA LANDINGS 1944-45 AV.
3/LANDINGS--CERTAIN AREAS OF N. J. - 7/44-6/45
4/BOSTON, GLOUCESTER, PORTLAND, NEW BEDFORD LANDINGS 1944-45 AV.

An example of the second type of variation (within a specific area) is given in Table 1 (items 2 and 3). Here records of production of finfish and shellfish in certain areas of Long Island, N.Y., are shown. The peak of finfish production occurs in the late spring; whereas, the heaviest shellfish production occurs in the late fall. This situation is shown graphically in Figure 2 (see p. 11).

Examples of accelerated variations are shown in Table 1 (items 9 and 10). Figure 3 (see p. 12), referring to the shrimp industry of the Gulf States, graphically depicts this type of variation. This industry has what may be termed a "double" peak. It reaches a peak in May after a low in the preceding March and its high point in October. A similar double peak variation may be seen in the case of the menhaden fishery in the South Atlantic area.

Table 1 summarizes the production conditions prevalent in the fishing industry for the important areas of the United States.

Table 1 - Monthly Data on Fish Production or Marketings in the United States Showing Seasonal Variations

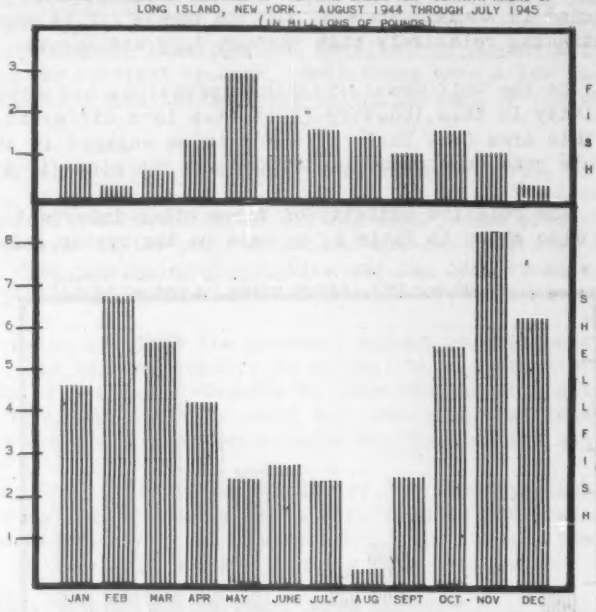
Area and Description of Data	Item No.	Period	Peak Month	Percentage of Peak Month's Production or Marketings											
				Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
NORTH ATLANTIC AREA															
Boston, Gloucester, Portland, and New Bedford landings	1	1944-45 av.1/	60,547,000 lbs.	27	35	62	62	97	100	95	91	70	69	53	35
MIDDLE ATLANTIC AREA															
Certain areas of Long Island, N. Y.:															
Landings of finfish	2	8/44-7/45 2/	2,995,000 lbs.	24	10	21	45	100	65	55	49	37	55	37	14
Landings of shellfish	3	8/44-7/45 2/	8,396,000 lbs.	54	80	67	50	29	34	28	4	30	65	100	75
Certain areas of New Jersey landings	4	7/44-6/45 2/	12,328,000 lbs.	18	17	24	81	100	60	40	52	30	23	38	12
Norfolk, Virginia area landings	5	1944-45 av.1/	3,277,000 lbs.	68	97	100	65	85	66	76	81	48	26	21	38
Number of menhaden utilized by reduction plants:															
New York-New Jersey-Delaware area	6	1946 3/	298,619,000	-	-	-	2	2	37	67	100	47	9	-	-
Chesapeake Bay area	7	1946 3/	58,346,000	-	-	-	10	19	100	70	95	51	25	6	-
SOUTH ATLANTIC AREA															
Production in certain areas of Florida	8	7/41-6/42 2/	3,720,000 lbs.	79	56	46	39	31	32	33	50	55	70	100	75
Number of menhaden utilized by reduction plants	9	1946 3/	65,788,000	21	-	-	16	45	77	64	44	17	17	100	61
GULF AREA															
Shrimp production for canning and other purposes	10	1941-43 av.	77,000 bbl.	25	16	7	16	38	29	14	60	70	100	72	40
Oyster receipts	11	1943-45 av.	149,000 bbl.	50	84	100	79	26	6	4	4	8	15	20	22
Hard crab receipts	12	1943-45 av.	2,056,000 lbs.	6	11	18	44	71	100	81	71	43	45	38	8
Number of menhaden utilized by reduction plants	13	1946 3/	31,519,000	-	-	-	-	31	89	100	59	33	8	-	-
GREAT LAKES AREA															
Chicago fresh, domestic fresh-water receipts	14	1943-45 av.	3,413,000 lbs.	43	44	56	78	100	90	67	75	63	69	77	52
PACIFIC AREA: California															
Sardine catch	15	1943-45 av.	130,000 tons	42	18	-	-	-	-	-	38	73	100	59	47
Tuna catch	16	1943-45 av.	22,086,000 lbs.	11	22	23	39	68	66	84	100	64	59	44	47
PACIFIC AREA: Oregon-Washington															
Oregon landings	17	1943-45 av.	15,118,000 lbs.	6	7	15	28	40	49	57	100	76	39	21	8
Seattle landings	18	1943-45 av.	8,079,000 lbs.	5 4/	10 4/	14	25	75	100	74	33	43	44	19	11
Seattle shellfish receipts (excluding Gulf of Mexico shrimp)	19	1943-45 av.	563,000 lbs.	100 4/	89 4/	71	69	85	67	36	27	27	80	90	90

1/1944-45 data only. New Bedford not included in New England 4-port landings prior to 1944, and Norfolk, Virginia area landings not published prior to 1944.
2/Complete monthly series of data for other 12-month periods not available.
3/Data for prior years not available.
4/1944-45 av. - January and February 1943 data not available.

In the North Atlantic area, the peak is reached in June while the low is reached in January. Production in the latter month is 27 percent of the peak month. Production during July and August remains on a fairly high and stable level, over 90 percent of the peak month, while September and October decrease to a production figure of about 70 percent of the peak month. November brings about a rapid decline to 53 percent. A sizable recovery does not occur before May.

The South Atlantic area shows nearly the reverse situation, starting with a peak production in Florida in November, and reaching a low in May equivalent to 31 percent of peak production. The two months following the peak have an approximately even production of 77 percent of the peak month, while the two months following the low remain on an approximately even basis at 32 percent of the peak production.

FIGURE 2 - MONTHLY LANDINGS OF FISH AND SHELLFISH--CERTAIN AREAS OF LONG ISLAND, NEW YORK. AUGUST 1944 THROUGH JULY 1945 (IN MILLIONS OF POUNDS)



Data on menhaden production are also given for this area. They show a double peak, one occurring in June and the other in November. Production commences in April after two months of inactivity and rises to a peak in June. Then there is a gradual decline through the summer months until another low is reached in September and October. Both of these months are 17 percent of the peak month of November. Production continues fairly high through December, with an abrupt decline commencing in January.

For the fishery industries of the Middle Atlantic area, comprising the Atlantic seaboard States from New York to Virginia, five different series of data are included in Table 1. They show the relative activity of finfish and shellfish production in this area.

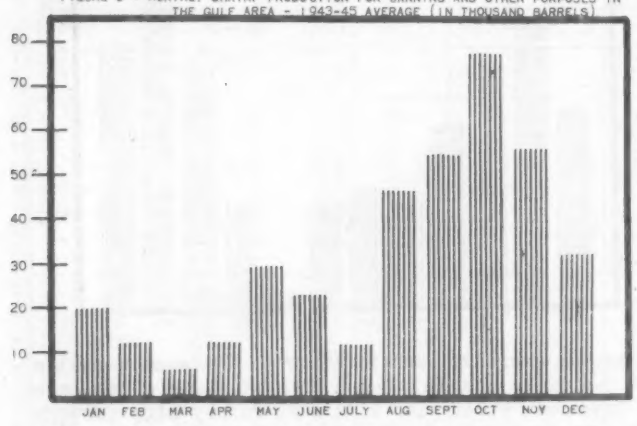
The peak month of finfish production in the Long Island, New York, area is May, and the low production, which is 10 percent of the peak, occurs three months earlier, in February. In the Norfolk, Virginia, area, the peak of finfish production is reached in March, when pound net fisheries are commencing operations and boats engaged in the trawl fishery are operating. The low occurs in November, when production is 21 percent of the peak. Another high occurs in May, due almost entirely to the catch of pound net operators. The months of June, July, and August follow on relatively high levels. The data on shellfish are for the Long Island, New York, area, and show production to be highest in November and lowest in August, when it amounts to only 4 percent of the peak. The two industries, based on shellfish and finfish, have peaks and lows directly opposite to one another.

Activity of the Middle Atlantic menhaden industry is given by two series of menhaden production figures, one for the New York-New Jersey-Delaware area and the other for the Chesapeake Bay area. Significant operations do not start in these areas until June. In that month, the legal season for purse seining of menhaden begins in Virginia. Prior to that month, menhaden are caught in pound nets in both areas, but this type of gear provides only an insignificant portion of the catch. At the close of the season, the Chesapeake Bay area operates one month longer than the New York-New Jersey-Delaware area. The peak for the latter is reached in August; whereas, for the former, it is reached in June, with production continuing relatively high through July and August.

On the Gulf Coast, fishing operations are conducted primarily for shrimp. Activity in this industry fluctuates in a different manner from other fisheries in this area (see Table 1). For those engaged in shrimp operations, there is a double peak, one occurring in May and the other in October.

The relative activity of three other important segments of the Gulf fishery are also shown in Table 1, by data on the oyster industry, the crab industry, and the menhaden industry. Production of oysters is heaviest during the first four months of the year. A peak is reached during March. Activity continues fairly high during April and from May on an abrupt decline occurs. A low is recorded during July, when production is only 4 percent of the peak. Heaviest production of hard crabs occurs during June. A gradual decline begins in July, until a low is reached in January, when production is only 6 percent of the peak month. Menhaden production is highest in July and no activity is recorded from November through April.

FIGURE 3 - MONTHLY SHRIMP PRODUCTION FOR CANNING AND OTHER PURPOSES IN THE GULF AREA - 1943-45 AVERAGE (IN THOUSAND BARRELS)



For the Great Lakes area, figures on Chicago receipts are given. They are not to be construed as having a bearing on labor requirements for the Chicago market. They represent only fresh, domestic fresh-water shipments, and the Chicago market handles many other varieties, such as salt-water species and shellfish. The figures in Table 1 for Chicago are an indication of the fishing activities on the Great Lakes. Activity there reaches a peak in late spring, the heaviest month being May. The low point is reached in January when arrivals amounting to but 43 percent of those for the peak month of May are recorded. The variations in this area are not subject to the extreme degrees of fluctuation which occur in other areas. The months of July through November remain on an approximate 70 percent level as compared to the peak, and the months of December through March, on an approximate 50 percent level.

Fishing on the Pacific Coast in the California area is conducted mostly for sardines, tuna, and mackerel. The landings of the respective catches are concentrated in certain areas of that State. In California, sardines are produced almost entirely

for reduction and canning. There is a closed season on the production of sardines for reduction and for canning in can sizes larger than 10 ounces from March through July. The season opens in August, ends on March 1st, and the peak is reached in October. In the tuna industry, the peak is reached in August, with relatively high activity during May, June, and July, when the sardine season is closed. The lowest month of tuna production is January, representing 11 percent of the peak month.

For the Pacific Coast in the Oregon and Washington area, monthly records of Oregon landings and Seattle receipts are given in Table 1. These consist mostly of salmon, halibut, and groundfish. For Oregon, landings are heaviest in August and for Seattle, Washington, landings are heaviest in June. Both areas have a low in the month of January. In that month, Oregon landings are only 6 percent of the peak, and Seattle, only 5 percent.

The peak of activity for the shellfish industry on the West Coast, as indicated by Seattle receipts, occurs in the winter, during January, and gradually decreases during the summer months to a low in August and September, when production is still fairly active at 27 percent of the peak. Recent information indicates that the important oyster and razor clam canning industry in this area has been reactivated after a wartime lapse. The peak of this industry is reached in the spring months.

For Alaska, the salmon catch provides the greatest amount of employment in the fisheries of this area. The salmon industry is subject to a limited season because of the short duration of the runs. Canning of this species does not get under way until May. There is little activity until the latter part of June and only relatively small amounts are packed after September to the close of the season.

To obtain an indication of activity in this industry, as shown in Table 2, data on production of canned salmon for three years were secured and averaged. They are weekly figures. Greatest activity on the average for the 1943-45 seasons occurred in the second week of July, while the following four weeks show a high

Table 2 - Weekly Data on Production of Canned Salmon in Alaska

Description of Data	Period	Peak Week	Earliest Opening Date To Last June Week	Percentage of Peak Week's Production							
				JULY Week				AUGUST Week			
				1st	2nd	3rd	4th	1st	2nd	3rd	4th
Production of canned salmon	1943-45 average	607,366 cases	-*	87	100	90	93	95	85	76	54
				SEPTEMBER Week			4th wk - Sept to latest closing date				
				1st	2nd	3rd					
				41	7	2	-*				

*These periods cover more than one week, therefore, no percentage computation was made. Production in both periods was less than the peak week.

average of 91 percent of the peak week. The week of lowest activity, except for some scattered production at the very beginning and the very end of the season, was the third week in September, which the table shows to be only 2 percent of the peak.

These data are an average for all of Alaska. Because of the wide expanse of coast line of that territory and the specific nature of the salmon run, the season in some local areas of the Western District is over before it has gotten well under way in the Southeastern District. Consequently, if local areas of Alaska are considered, variation in the production peaks of these local areas will be noted.

The following observations may be made with respect to the Pacific and Atlantic Coasts on the basis of the foregoing discussion. While on the Atlantic Coast, production peaks progress very definitely in accordance with climatic conditions in the various latitudes, on the Pacific Coast, peaks occur at about the same time in Alaska and in California.

The apparent possibilities which are created by the moving peak on the Atlantic Coast do not mean much in the solution of problems resulting from surpluses or deficiencies in manpower. In the first place, absolute quantities of fish caught in the North Atlantic area are much heavier than the absolute quantities caught in the Middle Atlantic or South Atlantic areas. In addition, types of fishing gear vary so greatly in the different areas that men skilled in the application of one gear cannot easily be transferred to another gear. Furthermore, distances are still so great that the cost of transferring great numbers of fishermen or of fishermen and their families would prohibit seasonal exchanges of labor.

For the fishery industries as a whole, and especially for those sections of the fishery industries in which peaks and troughs cannot be alleviated within the industry itself, the data presented herein should form the basis of better planning for the effective adjustment of the total available labor supply. They also serve to direct our thinking toward ways and means of moderating the repercussions of peaks and troughs by specific remedial measures. To be more precise, the following are given as examples of ways and means of alleviating these repercussions:

(a) In some areas, especially on the Pacific Coast of the United States, boat owners and boat operators have striven to develop boats and gear for year-round fishing. Notable examples of this are the boats on the Pacific Coast which have provisions for operating several of the following types of gear: purse seines, otter trawls, line trawls, shark gear, troll lines, and hand lines. These attempts have been successful to a certain extent. They should be supported by governmental agencies as well as private institutions which have an interest in stabilizing and equalizing fishermen's income on a year-round basis.

(b) The industry itself has made successful attempts to freeze large quantities of fish during the peak period for the purpose of extending canning operations into periods of the year when raw fish might otherwise not be available. This ambition of the industry itself; namely, to give its employees full employment during the whole year, or at least during the major part of the year, deserves the high praise and support of all who are interested in improving the social conditions of those employed in the fishing and fishery industries.

(c) In some areas, fishermen as well as processors have attempted to diversify their activities. In Florida, a large number of fishermen are trained carpenters and painters who offer their services during the summer months in the fast-growing cities of this southern State. In other areas, canneries which can shad and whiting for certain periods of the year, employ the same canning laborers throughout other periods in order to can fruits and vegetables.

(d) One means which may be used in all areas, affected by seasonal variations mentioned above, is the following. Fishermen as well as fishery labor might establish cooperative associations or credit unions for the purpose of keeping reserves accumulated in good months available for use in lean months and also for the purpose of making loans available to those who due to accident, illness, or other reasons, were unable to accumulate proper reserves during the last peak period.

Any successful action which is taken along the lines referred to in (a) to (d) certainly will result in some benefits for fishery industries operating under the disadvantages of extreme variations in employment. This study should assist the fishery industries by providing information concerning the basic seasonal production factors which are to be considered in order to make any of these plans mentioned above, and any others, successful and operative.

ESTIMATIONS OF EXTINCTION RATIOS AND VITAMIN A POTENCY OF 12 REDUCTION PLANT OILS

By G. C. Bucher,* F. B. Sanford,* and D. T. Miyauchi*

In recent months, the Seattle laboratory has received numerous requests for information concerning the vitamin A potencies of the oils produced by the local fish reduction plants. Most, if not all of these oils, are of low potency and any estimates of vitamin A content based upon non-biological methods may be in error.

In order to appraise the difficulties involved in the accurate determination of the vitamin A content of the oils, a number of them were obtained for study. Descriptions of the oils chosen are given in Table 1 (see p. 17).

Oser, et al,[1/] have shown that unless the extinction ratio $\frac{E\ 300}{E\ 328}$ is 0.72 or less, vitamin A values as determined by the ultraviolet absorption method are likely to be unreliable, even if the values are determined on the unsaponifiable portion of the oil. The extinction ratios $\frac{E\ 300}{E\ 328}$ of the 12 reduction plant oils examined (Table 2, p. 16) were all greater than 0.72. Saponification resulted in lower ratios, but did not reduce any of them to the 0.72 level. The unsaponifiable fractions of Sample No. 10 (English sole) and Sample No. 12 (ratfish) had very abnormal ratios.

It is obvious from these data that no great reliance can be placed on the vitamin A potency estimated by the ultraviolet absorption method even when the unsaponifiable portion of the oil is used. Nevertheless, a rough estimation of the potency of the reduction plant oils studied may be of interest. The data presented in Table 3 (see p. 17) indicate that the potency determined by the ultraviolet absorption and the antimony trichloride methods are in poor agreement, except for the oil from rockfish.

The data in Table 3, especially for Samples No. 11 and No. 12 which were known not to be mixtures, indicate that grayfish and ratfish carcasses are poor sources of vitamin A oils. Evidently, when these carcasses are mixed with rockfishes, or sources of a higher vitamin A potency, they serve only to lower the potency of the resulting oil. Thus, it may be advisable to separate the species yielding high potency oils from those yielding low potency oils. This problem will receive further attention by the staff of the laboratory.

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*Chemists, Fishery Technological Laboratory, Division of Commercial Fisheries, Seattle, Wash.

1/Oser, B. L.; Melnick, D.; Pader, M.; Roth, R.; and Oser, M. Ind. Eng. Chem., Anal. Ed. 17, 559-62 (1945).

Table 2 - The Extinction Ratio of the Whole Oil and its Unsaponifiable Fraction

Sample No.	Source of Oil	Source of Vitamin A	Extinction Ratio D_λ/D_{328} for Wave Lengths in mmu. (λ)															
			300	302.5	305	307.5	310	312.5	315	317.5	320	322.5	325	330	335	340	345	350
1	Rockfish offal	Whole Oil	0.934	0.951*	0.968	0.989*	1.010	1.069*	1.125	1.142*	1.115	1.071*	1.035	0.978	0.893	0.795	0.684	0.575
		Unsap.	0.790	0.828	0.866	0.923	0.958	0.980	0.992	0.998	1.007	1.020	1.022	0.972	0.878	0.777	0.656	0.530
2	Rockfish & sole offal	Whole Oil	0.910	0.928*	0.945	0.955*	0.985	1.020*	1.054	1.066*	1.059	1.040*	1.022	0.980	0.900	0.813	0.726	0.627
		Unsap.	0.842	0.876	0.916	0.950	0.985	0.998	1.010	1.016	1.022	1.033	1.025	0.974	0.895	0.785	0.670	0.556
3	Ratfish carcass	Whole Oil	1.589	1.572*	1.555	1.502*	1.448	1.547*	1.668	1.663	1.508	1.294*	1.117	0.954	0.836	0.727	0.650	-
		Unsap.	1.044	1.068	1.085	1.090	1.100	1.108	1.102	1.085	1.060	1.040	1.022	0.976	0.869	0.765	0.678	0.579
4	Grayfish & ratfish carcasses	Whole Oil	1.185	1.182*	1.180	1.172*	1.163	1.243*	1.349	1.363*	1.287	1.171*	1.070	0.965	0.870	0.767	0.680	0.590
		Unsap.	0.890	0.920	0.946	0.980	1.010	1.028	1.038	1.036	1.030	1.030	1.021	0.977	0.880	0.777	0.675	0.561
5	Ratfish carcass	Whole Oil	1.785	1.770	1.680	1.567*	1.520	1.600*	1.730	1.730*	1.585	1.348*	1.140	0.936	0.820	0.721	0.650	0.596
		Unsap.	1.005	1.020	1.017	1.022	1.043	1.065	1.084	1.075	1.035	1.005	0.997	0.986	0.875	0.750	0.707	0.644
6	Rockfish offal	Whole Oil	0.958	0.978*	0.991	0.997*	1.020	1.066*	1.110	1.127*	1.110	1.072*	1.035	0.980	0.900	0.805	0.704	0.600
		Unsap.	0.788	0.822	0.862	0.904	0.938	0.965	0.980	0.989	1.004	1.020	1.019	0.975	0.878	0.772	0.658	0.535
7	Unidentified	Whole Oil	1.045	1.065	1.070	1.066*	1.070	1.074*	1.090	1.090*	1.075	1.058*	1.035	0.974	0.896	0.814	0.733	0.650
		Unsap.	0.954	0.976	1.000	1.030	1.055	1.065	1.065	1.050	1.045	1.036	1.026	0.968	0.880	0.767	0.657	0.540
8	Col. River Smelt offal	Whole Oil	1.028	1.038	1.030	1.016	1.016	1.035	1.062	1.083	1.083	1.068	1.040	0.987	0.900	0.800	0.708	0.612
		Unsap.	0.932	0.944	0.954	0.968	0.987	0.990	1.000	0.990	1.010	1.015	1.015	0.973	0.898	0.805	0.702	0.600
9	Rockfish offal	Whole Oil	0.979	1.010	1.025	1.032	1.038	1.056	1.090	1.115	1.112	1.087	1.045	0.967	0.870	0.761	0.645	0.542
		Unsap.	0.817	0.850	0.886	0.928	0.962	0.983	0.995	1.003	1.014	1.025	1.023	0.972	0.876	0.770	0.652	0.527
10	English Sole offal	Whole Oil	1.630	1.660	1.654	1.574	1.474	1.405	1.400	1.425	1.430	1.340	1.190	0.908	0.742	0.618	0.523	0.444
		Unsap.	1.356	1.377	1.372	1.368	1.346	1.313	1.280	1.230	1.165	1.110	1.056	0.963	0.870	0.782	0.706	0.624
11	Grayfish carcass	Whole Oil	1.342	1.351	1.324	1.278	1.247	1.255	1.278	1.278	1.231	1.156	1.074	0.958	0.850	0.745	0.636	0.530
		Unsap.	1.022	1.044	1.055	1.062	1.073	1.073	1.070	1.062	1.052	1.045	1.037	0.974	0.876	0.762	0.652	0.537
12	Ratfish carcass	Whole Oil	1.700	1.698	1.640	1.550	1.490	1.487	1.514	1.500	1.413	1.280	1.135	0.934	0.797	0.687	0.595	0.510
		Unsap.	1.387	1.377	1.347	1.304	1.309	1.330	1.336	1.280	1.185	1.108	1.040	0.974	0.878	0.755	0.677	0.592

*Values obtained by interpolation

Table 1 - Description of Oil Samples

Sample No.1/	PROBABLE SOURCE OF OIL2/		OIL			
	Common and Scientific Names	Type of Waste	Color	Free Fatty Acids	Index of Refraction at 20°C.	Unsaponifiable Matter
				Percent		Percent
1	Rockfish (Sebastodes pinniger)	Offal	Orange	1.12	1.4775	5.4
2		50% rockfish & 50% sole offal	Red	5.32	1.4782	8.2
3	Ratfish (Hydrolagus colliei)	Carcass	Amber	1.73	1.4725	27.4
4		50% grayfish 50% ratfish	"	0.78	1.4745	21.8
5		Carcass	Brown	0.52	1.4710	30.5
6	Rockfish	Offal	Orange	1.80	1.4772	12.5
7		Unidentified	Red	3.48	1.4752	-
8	Columbia River Smelt (Thaleichthys pacifious)	Offal	Amber	-	-	15.3
9	Rockfish	Offal	Amber	-	-	3.4
10	English Sole (Parophrys vetulus)	Offal	Amber	-	-	2.7
11 3/	Grayfish (Squalus suckleyi)	Carcass	Amber	-	-	12.6
12 4/	Ratfish	Carcass	Amber	-	-	32.0

1/Samples 8, 9, and 10 were produced by wet rendering. The remaining oils were produced by dry rendering.

2/The principal constituents as estimated by the production plant manager. Usually varying amounts of other species such as skates and other scrap fish were also present.

3/Grayfish only, not a mixture.

4/Ratfish only, not a mixture.

NOTE: "Offal" is the waste portion remaining from filleting operations on rockfish and sole and from dressing operations on Columbia River smelt. "Carcass" is the round fish in the case of ratfish and skates and the round fish with the liver removed in the case of ratfish.

Table 3 - Comparison of Vitamin A Potency of Oils as Determined by the Ultraviolet Absorption and by the Antimony Trichloride Methods

Sample No.	Source of Oil	ESTIMATED VITAMIN A POTENCY			Deviation of potency estimated by ultraviolet method on the unsaponifiable portion from the antimony trichloride method on the whole oil
		Ultraviolet Absorption Method at 328 mmu.		Antimony Trichloride Method at 620 mmu.	
		Whole Oil	Unsaponifiable Portion	Whole Oil1/	
		USP units per gram	USP units per gram	USP units per gram	Relative percent
1	Rockfish offal	2140	1881	1819	-3.4
2	Rockfish and Sole offal	2350	1664	1717	+3.1
3	Ratfish carcass	1010	772	614	-25.7
4	Grayfish and Ratfish	1080	921	787	-17.0
5	Ratfish carcass	770	481	310	-55.2
6	Rockfish offal	2340	1917	1848	-3.7
7	Unidentified	1890	1162	1006	-15.5
8	Columbia River Smelt offal	490	479	372	-28.8
9	Rockfish offal	1310	1163	1000	-16.3
10	English Sole offal	360	241	-	-
11	Grayfish carcass	700	606	410	-47.8
12	Ratfish carcass	500	368	204	-80.4

1/Results were not obtained for the antimony trichloride method on the unsaponifiable portion

TECHNOLOGICAL RESEARCH IN SERVICE LABORATORIES

MAY 1947

Ketchikan, Alaska

Eight dozen cans of king salmon nuggets--a precooked frozen fish dish--were prepared and placed in the freezer.

* * *

Experimental packs were prepared of pickled salmon and octopus tentacles. Several experimental packs were made of fillets using methods adaptable to home canning.

* * *

Further surveys were conducted to determine probable toxicity of clams from different areas.

* * *

Tests were made of canned salmon waste preparations which had been in storage. Several packs suitable for human consumption showed commercial possibilities.

Boston, Mass.

Further studies were carried out in designing a container for shipping lobsters by air transport.

* * *

Meetings were held with Maine sardine packers to determine methods for sorting out fish affected with "pepper spot."

College Park, Md.

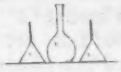
Periodic examinations were made of stored frozen oysters, fillets of Spanish mackerel, and sea trout. There was some deterioration of mackerel fillets in some types of packages after seven months.

* * *

Test-kitchen bulletin No. 2 entitled "Basic Fish Cookery" was submitted for publication and a test-kitchen bulletin on cooking oysters was completed.

Mayaguez, P. R.

Most of the month was required for taking a detailed inventory of equipment and terminating technological work at the laboratory because of a reduction in appropriations.

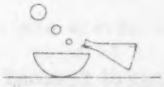


Seattle, Wash.

Some progress was made in work to develop improved analytical methods of vitamin A and oil extraction from fish livers having a low oil content.

* * *

Frozen steelhead trout retained their normal color in storage for a longer period when treated with NDGA as a test antioxidant.



BAKED HALIBUT STEAK

2 pounds halibut steaks
1 teaspoon salt
1/8 teaspoon pepper
paprika
2 tablespoons lemon juice
1 teaspoon onion, grated
4 tablespoons butter or other fat, melted

Sprinkle both sides of fish steaks with salt and pepper. Add the lemon juice and onion to the melted fat. Dip each piece of fish into this mixture and place in a greased baking pan. Pour the rest of the fat over the fish. Bake in a moderate oven 350° F. for 25 to 30 minutes or until fish flakes easily when tested with a fork. Sprinkle with paprika and garnish with parsley and lemon slices. Serve immediately on a hot platter. Serves 6.

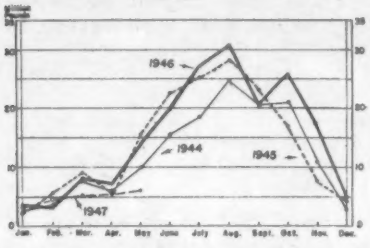
--Educational Leaflet 1

FRESH AND FROZEN FISH

New England

MAINE LANDINGS: Maine fishermen landed 6,558,000 pounds of fishery products, valued at $596,042 during May, bringing the total for the first five months of 1947 to 25,863,000 pounds, valued at $2,742,886, according to Current Fishery Statistics No. 353. Rosefish and soft clams were the leading items landed during May, accounting for 45 percent of the month's landings. For the year to date, rosefish, soft clams, lobsters, herring, and cod were the leading items, accounting for 77 percent of the total landings.

LANDINGS AT MAINE PORTS, 1944-47
By months



The catch by otter trawls during May was the largest of any gear, amounting to 2,491,000 pounds, followed by a catch of 831,000 pounds made by fishermen using hoes. From the standpoint of value to the fishermen, however, the catch by pots, consisting of lobsters and crabs, was the leading item.

During May, landings at Portland amounted to 1,122,000 pounds, valued at $45,223.

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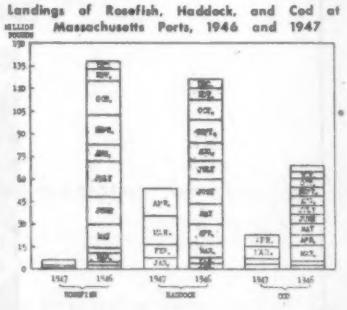
MASSACHUSETTS LANDINGS: Landings of fish and shellfish at the ports of Boston, Gloucester, New Bedford, Provincetown, and other Cape Cod ports during April amounted to 33,578,000 pounds, valued at $2,668,262 to the fishermen, according to Current Fishery Statistics No. 358. This represents an increase of 17 percent in volume and 42 percent in value as compared with the same month in 1946. Landings at Boston during the first four months of 1947 were 251 percent greater than in the same period of last year due largely to the price dispute which rendered most of the vessels inactive during the first part of 1946. Gloucester landings lag far behind last year's landings as a result of catch limitations on rosefish and price disputes in that port.

Landings of Rosefish, Haddock, and Cod at Massachusetts Ports, 1946 and 1947



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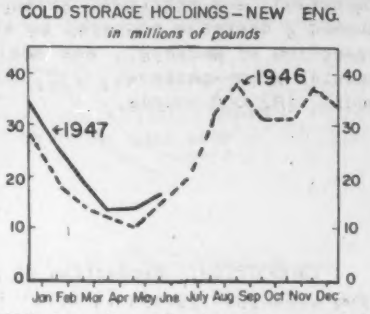
NEW ENGLAND COLD-STORAGE HOLDINGS: Fish and shellfish holdings in 20 cold-storage warehouses amounted to 17,554,000 pounds on June 1, according to the Service's Boston Market News Office. These stocks indicated an increase of 4,650,000 pounds compared with holdings on May 1 and were 3,648,000 pounds greater than those on June 1, 1946.

Boston warehouses on June 1 held stocks totaling 11,241,000 pounds. This was an increase of 2,940,000 pounds compared with May 1, and 5,386,000 pounds greater than stocks on June 1, 1946. Gloucester plants on June 1 held 2,761,000 pounds, a decrease of 434,000 pounds compared with the previous month and 355,000

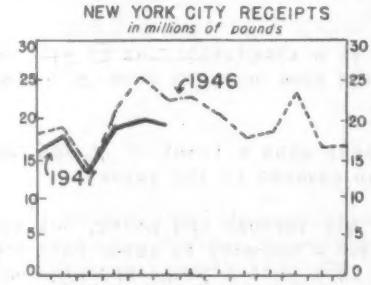
pounds less than stocks on June 1, 1946. The decline, instead of increase, in holdings of the Gloucester plants did not follow the usual trend. This was due to the small production of rosefish at Gloucester during May. Other New England plants held a total of 3,552,000 pounds on June 1, an increase of 2,144,000 pounds compared with May 1, but 1,383,000 pounds less than the holdings on June 1, 1946.



Items held in New England plants in quantities of over a million pounds were mackerel, whiting, and fillets of haddock, rosefish, pollock, and cod. Increases were noted in stocks of cod, flounder, and haddock fillets, and in halibut, herring, mackerel, and whiting, while declines were noted in holdings of salmon and fillets of pollock and rosefish. Increased landings of cod, haddock, rosefish, whiting, and mackerel during June will probably result in increased stocks for these items, and an overall increase in New England cold-storage holdings on July 1.

Middle Atlantic

NEW YORK CITY ARRIVALS: Receipts of fish and shellfish at the New York Fulton Market for the month of May 1947, totaled 19,005,000 pounds, according to the Fishery Market News Service Office in that city. This amount is about 500,000 pounds less than receipts in April 1947, and nearly 3 million pounds under the total for May 1946. Of the May 1947 total, about 70 percent was fish and 30 percent, shellfish.

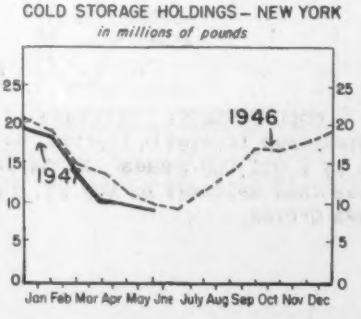


Leading items were flounders, mackerel, cod, scup, gray sea trout, shad, haddock, and yellowtails. Outstanding among the shellfish were clams, soft crabs, sea scallops, shrimp, lobsters, and squid.

Throughout the month of May, the demand was slow and the market was consistently sluggish.

* * * * *

NEW YORK CITY COLD-STORAGE HOLDINGS: Frozen fishery products in cold-storage plants in the New York metropolitan area amounted to 8,608,000 pounds on June 1, 1947, reports the Service's New York Market News Office. This is a decrease of close to 500,000 pounds compared with the previous month's holdings and a drop of over 1.2 million pounds below the stocks held on June 1 of last year. The decrease is a reversal of the usual trend at this period of the year and may reflect a reluctance on the part of local dealers to accumulate frozen stocks because of price uncertainties.



Principal items held were fillets of cod and haddock; halibut, mackerel, sablefish, salmon, and whitefish. Shellfish items were lobster tails (mostly imported), sea scallops, shrimp, and squid. Each of the above mentioned items showed a decrease compared to their respective holdings for last month with the exception of mackerel, sea scallops, and squid. The increases of these three species were--mackerel, 232,000 pounds; sea scallops, about 5,000 pounds; and squid, 182,000 pounds.

Chesapeake

PRODUCTION: Production of fish in the Hampton Roads area of Virginia decreased from 4,840,000 pounds in April to 4,230,000 pounds in May, or a little more than 12 percent, according to the Fishery Market News Office in Hampton. For the same month in 1946, the production for the area was 2,679,000 pounds. Of the total production, 1,397,000 pounds were croaker and 1,431,000 pounds were gray trout. In the Lower Northern Neck area of Virginia, the total catch amounted to 5,112,000 pounds, the largest production of any month since this office was opened. Almost 4 million pounds of this total was made up of alewives, or herring, whose value in dollars and cents was relatively low. Most of the other areas covered by our report were also higher, especially Ocean City, Md., where the production more than doubled that of the month before.

Production of fresh picked crab meat rose in all areas from 154,000 pounds in April to 245,000 pounds in May. This represents an increase of almost 59 percent. Production in May 1946 was 182,000 pounds.

Oyster production for the month was almost at a standstill, as it will be until September. Soft shell crabs from the Crisfield area began to show up during May and amounted to 166,120 dozens for the month.

For the first five months of 1947, our records show a total of 44,285,000 pounds of fish and shellfish produced in all areas covered in the report.

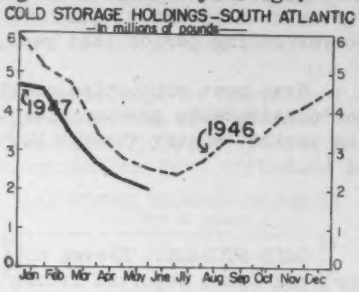
The demand for fish of top quality was good all through the month, but the production of small, trashy fish was heavy. This had a tendency to lower both the demand and the price. Small gray trout dropped to a cent a pound and pin-head croaker to a cent and a half. These were the prices paid to the fishermen. Crab meat prices dropped considerably during May, but the demand and price improved somewhat, the latter part of the month. The price of crabs to the fishermen was $4 per barrel.

South Atlantic

COLD STORAGE: Holdings of frozen fish and shellfish of five cold-storage warehouses located in Florida, Georgia, and South Carolina on May 22, 1947, amounted to 2,056,000 pounds, 14 percent less than four weeks previous and 20 percent less than holdings on May 23, 1946, according to the Jacksonville Fishery Market News Office.

Frozen shrimp holdings amounted to 254,000 pounds on May 22, 17,000 pounds less than four weeks previous, and 140,000 pounds greater than a year ago.

Salt-water fish holdings were 1,683,000 pounds, 306,000 pounds less than four weeks earlier and 686,000 pounds less than on May 23, 1946. During the last four weeks, the "in" movement of cod, rosefish, and pollock fillets and pompano was greater than withdrawals. However, this "in" movement was more than counterbalanced by greater withdrawals of scup (porgy), mullet, croaker, Spanish mackerel, whiting and king whiting, haddock fillets and miscellaneous other fillets.



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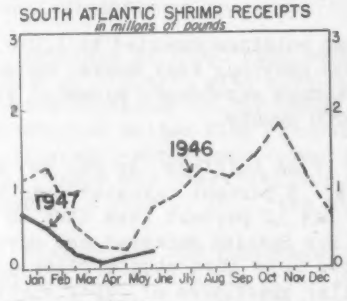
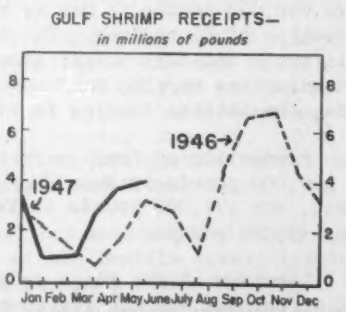


SHRIMP PRODUCTION: Shrimp production for Florida and the South Atlantic States, during May, amounted to 180,000 pounds (heads off), 58,000 pounds, or 48 percent, more than last month, but 301,000 pounds less than landings for the same localities in May 1946, according to the Jacksonville office of the Fishery Market News Service.

Florida landings were 123,000 pounds against 288,000 pounds for the same period last year--a decrease of 165,000 pounds, while Georgia landings were 136,000 pounds less than in May 1946.

Gulf

PRODUCTION: Shrimp landings for May in Alabama, Mississippi, Louisiana, and Texas, as reported to the New Orleans Fishery Market News Office, were 4,071,000 pounds, or 27 percent, greater than the previous month and 24 percent less than in May 1946. From January through May 1947, production was approximately 18 percent less than during the corresponding period last year. Landings in Alabama and Mississippi have been lower than last year, while in Louisiana and Texas landings have been greater.



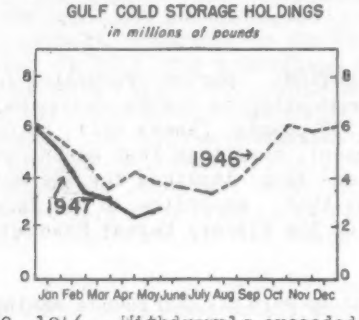
With the coming of warmer weather, oyster production, both for canning and for the raw trade, decreased. Landings during May were approximately one-third the quantity landed in April. During the first five months of this year, oyster landings were nearly 40 percent greater than for the same period in 1946. Greater quantities used for canning accounted for the increased production this year.

Fish landings, both salt-water and fresh-water varieties, were larger than during April. Landings from January through May, inclusive, were 7 percent greater for salt-water and 32 percent larger for fresh-water varieties than during the corresponding period last year.

Crab meat production continued to remain low, although production during May was considerably greater than the previous month. Production of this item during the period January through May 1947 was 42 percent less than for the same period in 1946.

* * * * *

COLD STORAGE: Eleven cold-storage warehouses in Alabama, Mississippi, Louisiana, and Texas reported frozen fish and shellfish holdings of 2,522,000 pounds on May 29, 1947, 10 percent greater than four weeks before, but 36 percent less than May 30, 1946, according to the New Orleans Fishery Market News Office.



Frozen shrimp holdings amounted to 1,050,000 pounds. During the previous four weeks, movement into the cold-storage warehouses exceeded withdrawals by 241,000 pounds.

Salt-water fish holdings on May 29 were 1,180,000 pounds, 5 percent greater than four weeks previous, but 42 percent less than on May 30, 1946. Withdrawals exceeded the "in" movement for Spanish mackerel and several other varieties. These withdrawals, however, were more than counterbalanced by greater "in" movement of red drum (redfish) and smaller quantities of other species.

Pacific

LANDINGS IN SOUTHERN CALIFORNIA: The total landings of fresh market fish in southern California, as reported by the Fishery Market News Office at San Pedro, were 730,000 pounds in May as compared with 829,000 pounds the previous month, or a decline of 12 percent. The most significant declines were in tuna, yellowtail, California halibut, shark, grouper, and sculpin; while mackerel, white sea bass, and anchovies were the only important species which had favorable increases. Barracuda, the leading species in volume, had only a slight decline.

Production of fresh market fish in the San Pedro-Santa Monica area amounted to 488,000 pounds in May 1947 as compared with 569,000 pounds in the previous month, and 477,000 pounds in May 1946. Landings, per day, varied from 4,300 to over 33,000 pounds.

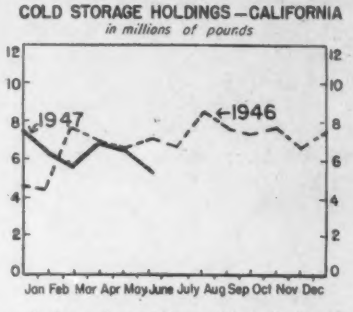
Landings at San Diego in May were 96,000 pounds, or a decline of 46 percent and 71 percent, respectively, compared with April 1947 and May 1946. No landings were received on several days, and the highest day yielded only 17,000 pounds.

At Newport Beach, the production in May of 146,000 pounds was an increase of 77 percent over the April 1947 production.

Prices in general were maintained at a fairly high level for this time of year.

* * * * *

COLD STORAGE: Holdings of fish and shellfish in storage in California on June 1, 1947, amounted to 4,971,000 pounds, or 5 percent less than those of May 1, 1947, and 2,068,000 pounds, or 29 percent less than the 7,039,000 pounds held on June 1, 1946, according to the Service's Fishery Market News Office in San Pedro. Shrimp accounted for almost two-thirds of the total decline between June 1, 1947, and June 1, 1946. Other species which declined appreciably were halibut, salmon, shad and shad roe, smelt, swordfish, tuna, unclassified salt-water fish, fresh-water fish, and clams and oysters. Fish for bait and animal food, crabs, lobster tails, and scallops were the only products showing significant increases in holdings.



Holdings of cured fish were 448,000 pounds on June 1, compared with 627,000 pounds for the previous month and 959,000 pounds a year earlier. Unclassified salted fish accounted for almost all of the drop from May 1 to June 1. All items, except mild-cured salmon, declined between June 1, 1946, and June 1, 1947. There was practically no mild-cured salmon in storage on June 1, 1946; whereas, on June 1, 1947, the holdings amounted to 90,000 pounds.

Even though the freezings during May 1947, amounting to 378,000 pounds, were 3 percent higher than in April 1947, they were 17 percent below the May 1946 total of 457,000 pounds. The principal increases during May were in bait and animal food, flounders and halibut, salmon, shad, unclassified salt-water fish, and crabs and crab meat. These were offset by large declines in freezings of shrimp and squid. A comparison of freezings during May 1947 with May 1946 reveals favorable increases in bait and animal food, shad, unclassified salt-water fish, and crabs while most of the better market fishes such as flounders, halibut, salmon, fillets, and shrimp declined.

* * * * *

ARRIVALS: Receipts of fishery products at Seattle during May totaled 5,686,000 pounds, according to the local Fishery Market News Office. This was an increase of about 18 percent over April's receipts, but nearly 2-1/5 million pounds, or 28 percent less than May 1946. Local sources contributed 2,643,000 pounds; imports, 2,049,000 pounds; and Alaska, 994,000 pounds. About one-fifth of all receipts was frozen fish.

The Pacific halibut season opened on May 1, but due to the tie-up of the Seattle fleet, landings at the local port fell far short of normal. The local vessels customarily fish the nearby Area II grounds; consequently, a large portion of this area's catch was diverted elsewhere. A limited number of Alaskan and Canadian vessels, however, landed their catches at Seattle which combined with other direct deliveries by packers and mis-

cellaneous craft raised the halibut total to nearly 2 million pounds, about one-third less than last year. Canadian imports accounted for well over half of such receipts. As the month closed, settlement of the dispute appeared no nearer solution and since nearly 37 percent of the season's quota had been caught, it was evident that the earnings of the Seattle halibut fleet would be greatly reduced.

On the other hand, deliveries of salmon and trawl fish were highly satisfactory. Over 1,623,000 pounds of salmon were received, mostly kings. This was more than double April's receipts and also exceeded those for May 1946 by about the same margin. Trollers were particularly active off Neah Bay and Westport, and upper Puget Sound gill netters were showing good early results. Most fishermen were optimistic over the current migration and many hoped to recoup a portion of last year's losses. Trawlers made 83 trips to the offshore grounds during the month and landed 1,068,000 pounds of bottomfish. This was an increase of 33 trips and 651,000 pounds over April operations, but nearly two-thirds of a million pounds short of last year. The areas south of Cape Flattery and west of Vancouver Island were most productive. Other important receipts consisted of soles, 604,000 pounds; rockfishes, 301,000 pounds; smelt, 212,000 pounds; and lingcod, 198,000 pounds.

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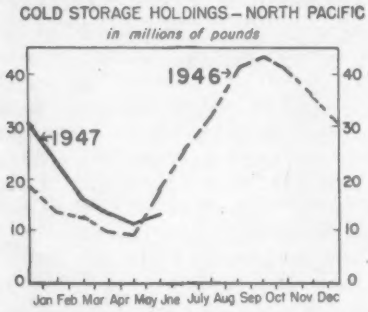
NORTHWEST COLD STORAGE: Holdings of frozen fishery products in 30 cold-storage warehouses of the Northwest region totaled 14,234,000 pounds on June 1, according to the Service's Seattle Market News Office. This represented an increase of more than 3¾ million pounds over the May 1 total but 2,828,000 pounds, or about 17 percent under the June 1, 1946 figure of 16,062,000 pounds.



Largely as a result of the Seattle fleet's inactivity, the Alaska and British Columbia cold storage warehouses absorbed the major portion of the Area II halibut catch and, in general, accounted for 54 percent of the area's frozen stocks with about 36 percent being held in Washington and the remaining 10 percent in Oregon warehouses. Heaviest holdings were reported for halibut, 6,211,000 pounds; bait and animal food, 2,687,000 pounds; sablefish, 1,784,000 pounds; and chinook salmon, 746,000 pounds.

Withdrawals of frozen chum salmon for canning purposes continued heavy and stocks of this item dropped nearly half a million pounds.

During May, 7,367,000 pounds were frozen, of which nearly 6 million pounds were halibut, slightly more than half a million pounds of chinook and silver salmon, and the balance mainly soles, and fillets. Since the Seattle halibut fleet was tied up, through disagreement, during May, freezings in Washington were comparatively light, less than a million pounds being frozen. Normally, two to three times that amount is frozen during the initial part of the halibut season.

Freezings of shellfish were exceptionally light with the bulk being crabs and crab meat.

Great Lakes

RECEIPTS: Receipts of fresh and frozen fishery products in the Chicago wholesale market during May amounted to 7,577,000 pounds. This represented an increase of 15 percent over receipts of the previous month and an increase of 18 percent over May 1946. Fresh-water receipts increased 5 percent over April while arrivals of salt-water varieties increased 2 percent. Receipts of shellfish and related items increased 88 percent during the same period, according to the Chicago Fishery Market News Office.

Except for lake trout and whitefish, deliveries during the month were so unpredictable that dealers, at times, were unable to handle certain varieties; while at other times, supplies were not sufficient to meet the demand. This condition had a very unsettling effect upon prices. This was especially true of rough fish, particularly sheepshead and buffalofish, during the early part of the month.

Lake trout, arriving in quantities 45 percent above those of the preceding month, enjoyed a demand that absorbed all available supplies; whitefish, however, receipts of which were 87 percent above those of April, were possibly the slowest moving item in the market, even with the price hovering around 20 cents for the greater part of May. Lake Erie sheepshead, in amounts 65 percent above those during April, compared with whitefish in lack of demand, most supplies of sheepshead being filleted to avoid loss. This item remained at a 3- to 4-cent price throughout May. Yellow pike and yellow perch, chiefly from Lake Erie and Michigan, arrived in amounts comparable to those of the previous month and were consistently in demand with very little price fluctuation during the month. Small supplies of yellow pike and pickerel from Lake of the Woods began to make their appearance toward the end of May.

Fresh halibut from the Pacific Coast made its seasonal appearance on May 12. The appearance of halibut and salmon in important amounts probably had something to do with the lack of demand for whitefish but it does not explain the consistent demand for lake trout.

Although most of the United States halibut fleet remained in port during the first month of the halibut season, arrivals of fresh halibut and salmon were comparable to those during May 1946. Most of the halibut arrivals were Canadian-caught fish, coming chiefly from Prince Rupert, British Columbia.

Shrimp receipts during May nearly tripled those of the preceding month and were 95 percent above those during May 1946. Of the 1,440,000 pounds received, 34 percent were fresh and most of the rest were frozen. Cooked and peeled shrimp formed less than one-half of one percent of the total. It was observed that shrimp in important amounts were being received by an increasing number of new receivers, people who had never received shrimp before and who deal in no other fish or shellfish. These receivers included an ice cream company and a dairy.

During May, oyster arrivals practically disappeared from the market, spiny lobster tails, some from South Africa, but mostly from Florida, arrived in important quantities.

The general price picture was good. A lot of varieties had fancy price tags but they are not out of line with prices in other food industries. Nearly all fast moving items were attractively priced. Halibut remained between 23 and 27 cents for medium fish throughout the month. Lake trout at the end of May was selling at a 38-40 cent price but had been lower for the most of the month. Whitefish, as has been stated, for most of the month was around 20 cents a pound. Fresh salmon showed little change, chinooks selling around 40-42 cents. The widest price variations were made in the rough fish section, especially buffalofish, a condition almost wholly controlled by the inclement weather.

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COLD STORAGE: Total holdings of fishery products in Chicago cold-storage warehouses on May 28, 1947, amounted to 4,822,000 pounds, reports the Service's local Market News Office. This represented an increase of 4 percent over stocks held on May 1, and was 9 percent below the total holdings on May 29, 1946.

Withdrawals during the month were evenly divided among fresh-water and salt-water items while shellfish holdings gained somewhat, due to storage of some shrimp. While shrimp showed the greatest gain among shellfish, the amount stored formed only a small part of the month's total receipts, most dealers preferring to keep their shrimp supplies in their own storage rooms, where it was originally delivered.

There was not enough change among fresh-water items to make comparisons of any moment. Among salt-water items, the chief gain of the month was made by the combined storage of cod, haddock, and pollock fillets; however, this gain was largely offset by the heavy withdrawals of rosefish fillets during the same period. Not only did rosefish fillet holdings decline greatly during the month, but dealers received heavy shipments that arrived directly from the East Coast. These arrivals were not handled through local cold-storage warehouses.

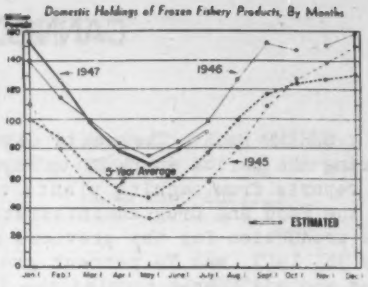
Halibut holdings changed only slightly during May, most arrivals of this species were handled directly by the dealers, most of it in fresh condition as very little halibut was frozen locally. Withdrawals of frozen salmon were not heavy due to arrivals of fresh fish, most of the frozen items withdrawn were used by smokers.

United States

COLD-STORAGE FREEZINGS AND HOLDINGS: Stocks of frozen fish and shellfish held on June 1 by firms reporting their activities to the Fish and Wildlife Service amounted to 79,733,000 pounds--14 percent above May 1st, according to Current Fishery Statistics No. 348. Halibut accounted for most of the increase in holdings during May. Stocks of this species increased from 2,542,000 pounds on May 1 to

8,350,000 pounds at the end of the month. Although the combined holdings of cod, haddock, pollock, and rosefish fillets continued to decline, June 1st holdings of these fillets were considerably greater than on the same date in 1946.

Data contained in this report on the domestic freezing and holdings of frozen fishery products are based on reports from 213 plants. These are principally public cold-storage warehouses.



AIDS FOR SMALL BUSINESS

The Office of Small Business, Department of Commerce, has prepared a number of bulletins in a series entitled "Small Business Aids." Most of these have been extracted, condensed, and reproduced from articles appearing in various trade publications. Many of these contain general information pertinent to the operation of a business. Copies of these bulletins may be obtained free of charge upon request from the field offices of the Department of Commerce. Sample titles are:

No.	Title
2	Business Assets in Addition to Stock and Good Will
6	Case Study - The Value of a Sound Credit Policy
8	What Price Service
15	What a Good Package Should Do
17	Public Warehouse Service
21	Finding the Right Color for Your Product
24	Meeting Super Market Competition
27	Color Schemes for Modern Store Designs
32	Points to Check in Your Sales Force
33	Packaging for Consumer Appeal
45	What do Customers Want?
64	The Advertising Appropriation for a Retail Store
79	Make Your Floor Space Produce Sales
85	Food Plant Sanitation
93	The Employee Suggestion Plan
103	Modernizing the Front of Your Store
115	Too Little and Too Late in Distribution
120	Significant Factors in Plant Location
139	Training Retail Employees Pays
140	Case Study - Introducing New Products to Combat Seasonal Operations
156	How to Analyze Your Local Market
161	Developments in Frozen Food Packaging
166	Case Study - Overcoming a Limited Line of Merchandise Carried in Frozen Food Stores

--Fishery Leaflet 243

CANNED AND CURED FISH

Shrimp

SHRIMP PACK: The pack of canned shrimp in Louisiana, Mississippi, and Alabama, during the period April 27 to May 31, amounted to 6,680 standard cases, according to reports from canning plants operating under the Seafood Inspection Service of the Food and Drug Administration. This was an increase of 133 percent over the production for the previous reporting period. The pack for the season, to May 31, 1947, was 79 percent greater than that for the corresponding period a year ago and nearly equaled the 3-year average for the same period.

Wet and Dry Pack Shrimp in all Sizes in Tin and Glass--Standard Cases*

MONTH		SEASON		
1947 Apr.27-May 31	1946 Mar.17-May 25	1946-47 July 1-May 31	1945-46 July 1-June 1	3-yr.average July 1-June 2
6,680	2,862	255,410	142,454	279,025

*All figures on basis of new standard case--48 No. 1 cans with 7 oz. per can in the wet pack and 6½ oz. per can in the dry pack.

Tuna and Mackerel

TUNA AND MACKEREL PACK: California tuna packers produced 551,406 standard cases of tuna during the month of May 1947, according to the California Division of Fish and Game. This represented an increase of 43 percent over the pack for April, and was 28 percent greater than that of May 1946.

The pack of 1,566,354 cases, for the first five months of the year, exceeded last year's pack, for the same period by 25 percent. For the third month in succession, the cumulative total of the tuna pack has exceeded that of the corresponding period last year by 25 or more percent.

The production of canned Pacific Coast mackerel continued to decline sharply. It amounted to 764 cases, but 2 percent of the April pack. The pack for the first five months of 1947, totaling 215,535 cases, was over 300 percent greater than that for the corresponding period in 1946.

California Pack of Tuna and Mackerel--Standard Cases*

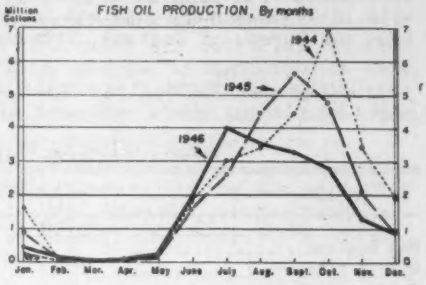
Item	May 1947	April 1947	May 1946	Five mos. ending with May-- 1947	1946
	Cases	Cases	Cases	Cases	Cases
Tuna:					
Albacore	-	309	-	311	25
Bonito	629	455	240	12,801	4,250
Bluefin	5,369	11,589	28,231	50,307	70,614
Striped	59,244	34,894	39,805	182,741	103,917
Yellowfin	382,508	256,272	273,643	1,021,986	812,747
Yellowtail	3,629	839	2,667	10,485	23,215
Flakes	98,615	79,550	85,378	279,049	227,717
Tonno style	1,412	759	-	8,674	-
Total	551,406	384,667	429,964	1,566,354	1,242,485
Mackerel	764	3,720	2,654	215,535	53,713

*Standard cases of tuna represent cases of 48 7-ounce cans, while those of mackerel represent cases of 48 1-pound cans.

FISHERY BYPRODUCTS

Oil and Meal

PRODUCTION: The domestic production of fish oils during May amounted to 194,713 gallons which is about normal for this month, according to the Service's Current Fishery Statistics No. 359. The total production of fish oils during the first five months of 1947 amounted to only 614,254 gallons compared with 890,540 gallons during the same period in 1946 and 1,446,253 gallons during the first five months of 1945. Reduced yield of pilchard oil during January and February was responsible for the major portion of the decline.



The May production of fish meal by firms which normally account for 94 percent of the total yield amounted to 6,404 tons, 18 percent less than the production in May 1946. The 5-month yield of fish meal amounted to 18,207 tons, compared with 23,225 tons for the same period in 1946, and 32,422 tons for the first five months of 1945.

The reduced quantity of rosefish scrap, which contains considerable oil, available for reduction during the current year and the increased supplies of cod fillet waste, which contains little oil, is reflected in the decrease of 77 percent in the yield of groundfish oil during the first five months of 1947 compared with the previous year, while the yield of meal declined only 28 percent.

FAO FOOD COMPOSITION REPORT

"Energy Yielding Components of Food and Computation of Calorie Values" is the title of a recent report published by an FAO Committee on Calorie Conversion Factors and Food Composition Tables. The report is divided into two sections. The first deals with the determination of energy yielding nutrients, while the second covers the problem of estimating their physiological values in terms of calories. Copies of the report--FAO/N47/1--may be obtained from the Food and Agriculture Organization, 2000 Massachusetts Avenue, Washington 6, D. C.

OTHER FISHERY NOTES

Additions to the Fleet of U.S. Fishing Vessels

A total of 151 vessels received their first documents as fishing craft during May 1947, compared with 110 in the same month the previous year. The State of Washington led with 42 vessels documented during the month followed by California with 18 vessels and Louisiana with 14 vessels, according to information received from the Bureau of Customs, Treasury Department.

During the first five months of 1947, 509 vessels received their first documents as fishing craft, compared with 351 vessels during the same period in 1946.

Vessels Obtaining Their First Documents as Fishing Craft

Section	May		Five mos. ending with May		Twelve Months
	1947	1946	1947	1946	1946
	Number	Number	Number	Number	Number
New England	8	8	31	25	86
Middle Atlantic	10	6	34	22	74
Chesapeake Bay	7	5	30	25	71
South Atlantic and Gulf	40	21	162	100	351
Pacific Coast	69	52	197	131	375
Great Lakes	9	11	31	29	76
Alaska	4	6	10	8	19
Hawaii	2	1	9	2	17
Unknown	2	-	5	9	16
Total	151	110	509	351	1,085

Note: Vessels documented by the Bureau of the Customs are craft of 5 net tons and over.

The Agar Industry of North Carolina

Carteret County, North Carolina, the producer of more fishery and marine products and byproducts than any county on the South Atlantic Coast, added another industry to its assorted collection, during the war years--the agar industry--according to the Service's Fishery Marketing Specialist in the area. The lowly seaweed has been utilized as a commercial product, and Carteret County fishermen have found another source of income, in addition to their already varied operations; one that can be carried out separately or as a supplement to other fishing activities.

Collecting Methods: Using skiffs in conjunction with larger power boats which act as cargo carriers, the gatherers pick seaweed from the bottom of the shallow water with pitchforks, rakes, and, occasionally, with trawls and nets. No skiff is needed when trawls are used and the weed is hoisted directly aboard the power

boat from which the trawl is pulled. When the weed is in the harvesting condition, it is usually unattached, drifting freely with the prevailing current but near the bottom.

Primary Processing: After harvesting, the plant must be culled from all materials unusable in the extraction of agar. By failing to clean the weed; i.e., to clean sand, straw, dead and useless weeds, etc., from the catch, the gatherer forfeits a portion of the full price for the catch. The price varies in proportion to the amount of foreign matter present when the manufacturer buys the catch.

After culling, the weed must be dried. This is done by spreading it over wire drying platforms usually two or three feet off the ground. Except during wet weather, the weed will dry sufficiently for manufacture within three days, and sometimes sooner. The price is dependent upon the degree of dryness.

Price and Income Data: The price paid to gatherers during the past year has averaged 10 cents per pound for dry, pure weed. However, prices much less than this have been paid when the gatherer failed to cull it properly, or did not dry it thoroughly as required by the manufacturer.

During 1946, the most constant gatherer on the payroll of the manufacturer grossed $1,800 over a period of 5½ months, and this was earned in addition to income from his normal fishing activities. The average annual earnings are much less, but this higher figure is an indication of the potential extra income available to the regular fishermen who gathers the seaweed that is so abundant in the shallow waters of Carteret County.

Seasonal Aspects: No definite seasonal pattern is evident in the production of the weed in this county; the only county where it seems to be available in quantity. It is available at all seasons, but if there is any "best" season, it appears to be from July through December. However, it has been taken at other times often enough to indicate that something other than seasonal changes determines its appearance.

Abundance: The weed is present in commercial abundance to the extent that the local manufacturer could operate from four to five months annually, using only locally-produced weed. However, it is the practice of the manufacturer to augment his local supply with seaweed from Florida in order to continue operations on a yearly basis.

Only one concern is currently engaged in the manufacture of agar in Carteret County, and the present supply is not believed large enough to attract other manufacturers. However, other concerns have shown interest to the extent that they agreed to teach some of the fishermen how to process the weed and financed the erection of drying facilities to be paid from the earnings of the fishermen. It is estimated that in 1946, three fishermen gave approximately one-third of their time to gathering seaweed and more than 50 others contributed to the total catch.

Fishery Resources of the United States

Edited by Lionel A. Walford

PUBLIC AFFAIRS PRESS, 2153 FLORIDA AVENUE, N. W., WASHINGTON 8, D. C.

134 PP. $5.00

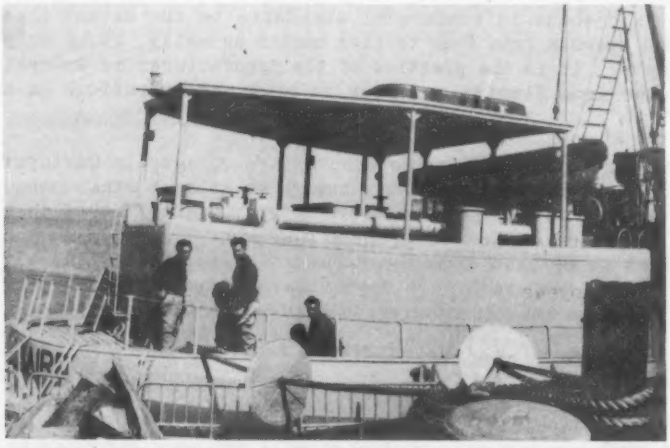
Fishery Resources of the United States has already achieved considerable well deserved popularity as "the Bailey-Bland report" and "Senate Document No. 51." It received the former designation in honor of the Senator and Congressman who sponsored Public Law 302, 78th Congress, requiring the report, and Senate Concurrent Resolution No. 14, 79th Congress, providing for its earlier publication.

The 134 pages, with illustrations on practically every page, condense much of the knowledge of the Fish and Wildlife Service's far-flung staff into brief paragraphs, pertinent charts, and lifelike sketches. Under the able editorship of Dr. Walford, now Chief, Section of Marine Fisheries in the Service's Division of Fishery Biology, the facts about our nation's fishery resources in both domestic and international waters are presented in an interesting but concise manner. The addition of better paper and cloth covers with a fishery motif, and the use of shades of green in the illustrations instead of black are contributions of the publisher, which, together with a colorful dust jacket, add much to the appeal of the work. It is a nice edition to have on your shelf of fishery volumes.

--A. W. Anderson

FWS Vessels Depart for Philippines

Albert M. Day, Director of the Fish and Wildlife Service, announced on June 29 that two fishery research and experimental fishing vessels, designed and equipped for the Philippine Fishery Rehabilitation Program, departed from San Francisco for Manila on June 26. From San Francisco, the vessels are to proceed to Los Angeles for a test run and, upon refueling, are to leave for Honolulu about June 28. Stops for fuel and supplies will be made en route at Honolulu, Wake, and Guam. It is expected that the vessels will arrive in Manila about July 25.



SPENCER F. BAIRD - VIEW OF STERN OF VESSEL SHOWING BAIT TANKS AND FISHING RACKS.

The Spencer F. Baird, under the command of John P. Lowman, is the former U. S. Army LT-581 which has been converted into a combination oceanographic vessel and tuna clipper. It is 143 feet long, with a 43-foot beam and a draft of 16 feet.

Propulsion power consists of twin Diesel electric installations geared into a single shaft and propeller which provides very flexible speeds of operation, ranging from 1½ to 14 knots. The vessel is equipped with all of the latest electronic and special devices for navigation and oceanographic research. A complete biological and chemical laboratory is installed on the main deck, as well as special winches for handling hydrographic gear, and experimental trawls and other types of nets. A sharp-freeze compartment for experimentation with freezing fish at sea is located in the after hold. On the after deck, bait tanks have been installed which are equipped with refrigeration and aeration which will make possible experimentation in the handling of bait under all types of conditions. Fishing racks have been installed aft, around the stern of the boat which will be used for tuna fishing by means of poles, as carried on in the Southern California tuna fishery.

The Theodore N. Gill, under the command of Fred C. Zeisenhenne, is the former U. S. Navy mine sweeper, AMc90, and is an experimental purse seiner and west coast type trawler. It is 90 feet long, has a 23-foot beam and a draft of 11 feet. Power is supplied by a six cylinder Diesel engine with reduction and reversing gear which provides for a cruising speed of about 10 knots. Like the Baird, but on a somewhat reduced scale, it is equipped for oceanographic work and has a small biological and oceanographic laboratory. A turntable on the stern is provided for the operation of purse seines as large as any now in commercial use in either the sardine or tuna industries. Trawling gear is of the west coast type. A winch boom, and other necessary installations for this type of gear have been provided. Beneath the after deck is a refrigerated cold-storage hold that will accommodate catches of between 15 and 20 tons of fish. There is also a sharp-freeze compartment for experimental use.

"In out-fitting these vessels," Mr. Day said, "the Service has attempted to incorporate all of the most advanced ideas and equipment for research at sea and experimental fishing. The scientific and experimental fishing data will not only aid the residents of the Republic of the Philippines in modernizing their fisheries and in extending operations to new grounds, but will also provide technical data on new types of operations which will be useful to the fishing industries of the United States."

The bulk of the scientific staff which has begun research on the pond-fish industries is already in Manila and is making ready the shore laboratory which will be used for analysis of the oceanographic materials and experimental work in fish processing and the preparation of fishery byproducts.

Mr. Hugh W. Terhune, the Administrator of the Philippine Fishery Program, who has been maintaining temporary headquarters in San Francisco, will leave for Manila, by air, about July 1. By August, it is anticipated that the Philippine Fishery Rehabilitation Program, involving the employment of over 80 scientific, administrative, and fishery employees, will be in full operation.

Canned Fish

In Purchase Announcement FO-32, the Production and Marketing Administration, U. S. Department of Agriculture, stated on July 18 that it would receive offers for the sale of canned fish of the following species: Mackerel, sea herring, river

herring (alewives), and other species of standard packs in a comparable price range. Purchases were limited to fish packs only; that is, packs which contained potatoes, cereal, or any other similar ingredient would not be considered.

Purchases were to be made under contracts executed in the name of the Commodity Credit Corporation. Offers, on Offer of Sale Form FOO-32, were to be received on or before July 29, 1947, or on either August 5, 1947, or August 12, 1947. Offers were to be submitted to Fish and Fish Products Division, Fats and Oils Branch, Production and Marketing Administration, U. S. Department of Agriculture, Washington 25, D. C.

Notice of acceptance was to be given by telegram filed in Washington, D. C., on or before the Monday following each Tuesday closing dates stated above. The Commodity Credit Corporation reserved the right to reject any or all offers.

Offerings were to indicate quantities for delivery within the following thirty days. A separate offer form was to be used for each species of fish. Offers of fish that did not come within the specifications of paragraph 4(a) of the Offer of Sale Form were to be accompanied by six sample cans of each type of fish offered. Samples had to be clearly marked or labeled for identification.

It was preferred that fish be packed in No. 300 cans or cans of approximately that size containing 14, 15, or 16 ounces per can, but consideration was to be given to offers of fish packed in No. 2 cans. All cans were to be labeled with vendor's commercial label. Cans might be packaged 24 per case but cases containing 48 cans were preferred.

Commodity Credit Corporation preferred the cases to be suitable for export. Vendor could use any export type case available to him but 90-point or 100-point solid fibre or 23-9-16 or 23-9-23 corrugated cases were acceptable. Cases did not need to be weatherproofed. Strapping was required and offerors had to indicate in the space provided on the Offer Form, the additional cost, if any, for strapping material and labor.

Excerpts from Offer of Sale Form FOO-32 follow:

4. a. Specifications Applicable to Mackerel, Sea Herring and River Herring (Alewives): Fish shall be reasonably firm for the species of good appearance and well cleaned. Fish shall be practically unbroken and cans shall be packed as full as practicable. Fish shall be packed natural or with added oils, tomato sauce or other sauces as may be specified by CCC. Each No. 300 can of Sea Herring shall contain not more than nine (9) fish and each No. 300 can of River Herring shall contain not more than seven (7) fish. The number of pieces of the tail cut of the fish in any lot shall be approximately equal to the number of fish in that lot. The cans shall have not less than four (4) inches of vacuum.

b. Definitions:

1. The term "natural" means without the addition of any condiment except salt, or brine which may contain up to 2% vinegar, but may have added oil of the same species of fish.

2. The term "well cleaned" means that the fish shall have the head and tail removed, shall be practically free from scales (i.e., scales shall not cover more than five (5) percent of the surface area), shall be reasonably free from entrails, feed and objec-

tionable material. In mackerel the blood sac along the backbone shall have been punctured to allow drainage of blood.

3. The term "net weight per can" means the total weight of the fish and liquid in the can.

c. A lot shall be considered as meeting specifications if not more than one-sixth of the containers in a lot fail in some respect to meet the requirements of the specifications; provided that none of the containers which may fail to meet the specifications shall fail to meet the requirements of the Federal Food, Drug and Cosmetic Act and amendments and regulations thereunder.

d. Specifications Applicable to Other Species: (a) The canned fish shall be equal to or better than the samples submitted with this offer, and shall be prepared and canned under strictly sanitary conditions in accordance with the best commercial practice. Vendor shall attach a brief description of the product. (b) All canned fish delivered hereunder shall conform in every applicable respect to the requirements of the Federal Food, Drug and Cosmetic Act as amended and of regulations pursuant thereto.

5. Inspection: Inspection of the fish must be made by CCC or its designee, prior to shipment. The cost of inspection, including furnishing samples and issuing certificates of inspection, will be borne by the vendor.

6. Packaging and Markings:

(a) Cans: Cans shall be of the usual commercial type and at the time of delivery shall be sound and clean, free from rust and serious dents.

(b) Labels: Cans shall be labeled or lithographed with vendor's commercial labels or markings.

(c) Cases: Cases shall be new and in good condition and of the type specified in Section 1 above.

(d) Strapping: Each case shall be strapped with two (2) metal straps.

(e) Markings: Each case shall be marked to show the name of the vendor, commodity, contract number, commodity code, net weight of cans and number of cans per case, and a legend which may be prescribed by CCC.

Wholesale and Retail Prices

Lower prices for agricultural commodities and hides and leather products caused a decrease of 1.2 percent in average primary market prices between March and April, according to the Bureau of Labor Statistics, U. S. Department of Labor. On those fish items for which data are collected, rather wide variations were disclosed. Percentage changes, from March 15 to April 15, varied all the way from a decline of 4 percent in the wholesale price of cured cod to an increase of 4.1 percent in the retail price of 1-pound cans of pink salmon.

Wholesale and Retail Prices

Item	Unit		Percentage change from--	
Wholesale: (1926 = 100)		Apr.12,1947	Mar.15,1947	Apr.13,1946
All commodities	Index No.	148.1	-0.1	+35.5
Foods	do	163.0	-2.1	+48.3
Fish:		Apr. 1947	Mar. 1947	Apr. 1946
Canned salmon, Seattle:				
Pink, No. 1, Tall	$ per doz. cans	3.066	0	+56.0
Red, No. 1, Tall	do	5.462	+1.8	+48.0
Cod, cured, large shore, Gloucester, Mass.	$ per 100 pounds	14.40	-4.0	+ 7.0
Herring, pickled, N. Y.	¢ per pound	12.00	0	0
Salmon, Alaska, smoked, N. Y.	do	35.00	0	0
Retail: (1935-39 = 100)		Apr.15,1947	Mar.15,1947	Apr.15,1946
All foods	Index No.	188.0	-0.8	+32.7
Fish:				
Fresh and canned	do	261.0	-1.9	+17.9
Fresh and frozen	¢ per pound	39.1	-4.3	+ 5.9
Canned salmon:				
Pink	¢ per pound can	39.4	+4.1	+59.0
Red	do	60.5	+2.2	+37.8

SOUTHEASTERN ALASKA HERRING FISHERY

The conclusion obtained from the estimates of the most probable contribution of the year classes within the fishery is that the abundance will be high in the season of 1947. The most likely source of deviation from the predicted contributions will be in the year classes of 1944 and 1945. The estimation of the strength of the 1944 year class has been obtained from its single contribution as 3-year fish in the season of 1946. As evaluated from its yield in that season this class appears to be of outstanding strength and its presence as 4-year fish should substantially raise the level of abundance over that of 1946. The 1945 year class will enter the fishery for the first time in 1947 and its estimated contribution is based only on the average contribution of entering year classes in former years which has approximated 9 percent. It can be stated with assurance that the fishing in 1947 will be exceptionally good.

--Fishery Leaflet 252.

FOREIGN FISHERY TRADE

Imports and Exports

GROUNDFISH IMPORTS: From January 1 to May 31, 1947, there were 9,702,928 pounds of fresh and frozen groundfish imported into the United States under the tariff classification, "Fish, fresh or frozen fillets, steaks, etc., of cod, haddock, hake, cusk, pollock, and rosefish." This was 10,477,809 pounds less than the imports of groundfish for the same period in 1946, according to a report from the Bureau of Customs of the Treasury Department. Canada was again the leading source of these imports. Newfoundland, with 1,720,550 pounds, was in second place, the position occupied by Iceland in 1946.

Country	1947		1946	
	May	5-month Total	May	5-month Total
Canada	2,144,090	7,110,976	3,082,041	15,826,312
Newfoundland	270,900	1,720,550	318,588	1,689,825
Iceland	-	871,402	245,394	2,662,844
Norway	-	-	256	1,756
Total	2,414,990	9,702,928	3,646,279	20,180,737

France

PROPOSED FILLETING PLANT AT ST. PIERRE AND MIQUELON: The Consulate General at St. John's, Newfoundland, has ascertained from a well-informed fish exporter, who resided for many years in St. Pierre and who now makes periodic trips there in connection with his business, that plans in St. Pierre envisage the completion and modernization of a huge filleting plant, having a capacity of 11,000,000 pounds--far larger than anything operating now in Newfoundland. The proposal, according to this exporter, is backed by a prominent financier in France who has substantial interests in fish plants in Bordeaux. It is contemplated that all exports will go to France. It is understood that seven trawlers are being constructed in Canadian rather than American shipyards as cited in a Newfoundland report, and that operations are being held up pending the arrival of motors from Switzerland to run the plant. These motors are intended also for use in supplying electricity for the entire city of St. Pierre.

Japan

FISHERIES: The Vitamin A-D Association has been appointed as the official receiving agency for all fish livers in the Tokyo-Yokohama area, according to a recent report from the Natural Resources Section of SCAP. The Association, composed of about 50 processors of fish livers, has agreed to make available for export all liver oil having a higher potency than 30,000 international units of vitamin A per gram. The fish distributors have been saving livers from tuna, bonito, and mackerel since June 15 and had accumulated 7,500 pounds in cold storage by June 23 for disposal to the Association for processing.

Tightening controls on fish distribution, the Japanese Government took over direct control of 60 major fishing ports, where the shippers were to be licensed and supervised by the Ministry of Agriculture and Forestry, according to General MacArthur's report in the occupation summary for April. Smaller ports were to be controlled similarly by the prefectural governments. As a further incentive to lure fish catches into legal distribution channels, official prices were raised an average of 50 percent effective April 19. Coastal whaling concerns operating in 1946 captured 1,863 whales.

Mexico

IMPORT DUTIES: The Departments of Commerce and State announced on July 11 that the Government of Mexico has taken action which will affect United States exports to that country. In decrees published July 11, 1947, in the Diario Oficial (Official Gazette), the Mexican Government took action to increase import duties on a selected group of commodities. The action was taken in order to check the heavy drain upon the Mexican reserves of foreign exchange by continued heavy imports.

The decree establishing increased rates of duties, also published July 11, will become effective 15 days from that date. The following classes of fishery commodities are among those affected:

Certain preserved fish, including codfish and sardines

* * * * *

TARIFF FOR FISHING IN MEXICAN WATERS: The Executive Order fixing the tariff for commercial and sport fishing in Mexican territorial waters of the Gulf of Mexico and the Caribbean Sea by vessels of foreign registry, returning with their catch to their home ports, entered into effect on July 2, 1947, according to a report from the American Embassy in Mexico City.

The tariff is progressively higher in proportion to the increase in tons capacity, fluctuating from Pesos 50 ($10.30)[1] annually for each general fishing permit when the vessels have up to two net tons capacity, to Pesos 2,000 ($412.00) when said net tons capacity exceeds one hundred tons.

The tariff also contains regulations on the registry of vessels and fishing nets, in which the quota of Pesos 5.70 ($1.17) annually for each net ton capacity or fraction thereof is set for the former, and Pesos 0.21 (4 cents) annually on each lineal meter or fraction thereof, based on the cork line, is set for the latter.

Other quotas are set for sport fishing, varying from Pesos 5 ($1.03), Pesos 25 ($5.15), up to Pesos 800 ($164.80) annually, depending upon the kind of fish which is to be caught and upon whether the applicants are foreigners residing outside of Mexico, Mexican nationals residing in the country, or foreigners residing in the country.

1/ Mexican peso equals 20.6 cents in U. S. currency.

The sport fishing permit, valid for one month, for private yachts is Pesos 25 ($5.15); for portable boats, Pesos 4 (82 cents); and much lower fees are set for Mexican boats.

Strict vigilance will be maintained in the Gulf of Mexico and the Caribbean to see that the foregoing regulations are fulfilled, and stern measures will be taken against any vessel fishing without the appropriate permit or without having paid the necessary fees.

It may be pointed out that the provisions of this Executive Order governing commercial and sport fishing in the Gulf of Mexico and the Caribbean are identical with those contained in the Executive Order of November 17, 1939, regulating commercial and sport fishing in the Gulf of California and the Pacific Ocean.

Newfoundland

REGULATIONS COVERING THE FILLETTING AND FREEZING OF FISH: Newfoundland's relatively new fresh-frozen fish industry is presently suffering a setback owing to marketing difficulties. Production, which rose rapidly from about 12,000,000 pounds in 1943 to some 24,000,000 pounds in 1944, reached a peak of about 31,500,000 pounds in 1945, and fell off slightly to 30,151,140 pounds in 1946. Production is expected to fall far short of this figure in 1947, according to the American Consulate General at St. John's, Newfoundland.

Loss of the British market and inability successfully to exploit the American market, coupled with increasing competition from Iceland and Norway, have constituted the principal marketing difficulties.

Newfoundland fisheries officials are well aware that marketing difficulties will only be magnified unless every effort is made to improve the quality of fish products, and to adopt standards that will make Newfoundland frozen fish readily acceptable. The hope is still held out that the United States will eventually constitute the principal market--particularly if pending international trade negotiations at Geneva are successful.

Under the powers conferred upon him by the Processed Fish (Licensing) Regulations, 1944, regulations covering the filletting and freezing of fish prescribed by the Newfoundland Fisheries Board were approved by the Governor in Commission on June 20, 1947. These regulations are given below in full:

CONDITIONS

1. All wooden boxes used for collecting, conveying or storing fish intended for filletting or fillets intended for freezing shall be manufactured from dressed lumber, painted on the inside with a non-lead paint or other satisfactory coating and kept thoroughly clean at all times.

2. All premises used in the filletting or freezing of fish shall have adequate toilet facilities of a sanitary type.

3. All premises used in the filletting or freezing of fish shall have an adequate number of sanitary wash basins supplied with fresh warm water, liquid or powdered soap and paper towels.

4. Signs requiring employees handling fish to wash their hands after each absence from post of duty shall be conspicuously posted about the premises.

5. No children under eight years of age shall be allowed inside any premises used in the filletting or freezing of fish.

6. No animals shall be allowed inside any premises used in the filletting or freezing of fish.

7. The inside bottom of all boats carrying fish intended for filletting shall be fitted with flooring in such a manner as to keep the fish from bilge water and other offensive matter.

8. The licensee shall provide and the employees shall wear some form of clean uniform or overalls and all female employees shall wear some adequate form of head covering.

9. The licensee shall require all employees to observe proper habits of cleanliness and shall not knowingly employ in or about the premises any person infected with an infectious or contagious disease.

10. The ground surrounding the premises to the extent of 25 yards in every direction shall be clean and free from objectionable materials, including decomposing animal or vegetable matter, and shall not be used for the pasturing or stabling of livestock.

11. The floors of all premises used in the filletting or freezing of fish shall be tight, of material satisfactory to the Newfoundland Fisheries Board, and so arranged as to permit thorough cleaning and proper drainage.

12. The inside walls of all premises used in the filletting or freezing of fish shall be so constructed and arranged as to permit thorough cleaning.

13. All surfaces of tanks, belts, tables, flumes, utensils and other equipment with which fish comes in contact shall be of material satisfactory to the Newfoundland Fisheries Board and so arranged as to permit thorough cleaning.

14. Adequate supplies of clean unpolluted running water shall be provided for washing, cleaning and otherwise maintaining the establishment in a sanitary condition. Only water certified as satisfactory for the purpose by a Laboratory using approved methods of examination and analysis shall be used.

15. A factory shall not be considered to be in a sanitary condition unless the floors, tables, equipment and utensils used are thoroughly washed immediately after each day's operations.

16. All licensees shall furnish to the Board, not later than the seventh day of each calendar month, a statement showing the quantities of each type of fish processed by them in the immediately preceding month and also their total holdings of such fish at the end of the same month.

RECENT FISHERY PUBLICATIONS

Listed below are informational publications which recently have been processed by the Division of Commercial Fisheries. FL publications are available, free of charge, from the Fish and Wildlife Service, Merchandise Mart, Chicago 54, Ill. Other listed publications may be obtained, also free of charge, from the Division of Commercial Fisheries, Fish and Wildlife Service, Washington 25, D. C.

Number		Title
CFS-344		- Frozen Fish Report, May 1947
CFS-346		- Massachusetts Landings, March 1947
CFS-347		- Fish Meal and Oil, April 1947
CFS-348		- Frozen Fish Report, June 1947
CFS-349		- Maine Landings, April 1947
FL-126	(Revised)	- Fish Reduction Processes
FL-129	(Revised)	- The Pacific Sardine Fishery
FL-221		- Temperature and Fishes
FL-231		- The Sea Urchin Fishery
FL-234		- Japanese Fishing Gear
FL-235		- The Kamloops Rainbow Trout
FL-236		- Fisheries Education and Research in Japan
FL-241		- Methods of Net Mending - New England
FL-243		- Aids for Small Business
FL-244		- Conversion of Selected Japanese Weights and Measures
FL-246		- Fresh-Water Mussel Shells
SL-12	(Revised)	- Wholesale Dealers in Fishery Products, Va., 1947
SL-19	(Revised)	- Wholesale Dealers in Fishery Products, La., 1946

Reprints (Separates) from Commercial Fisheries Review, June 1947.

Sep. No. 176 - A Technological Study of the Ocean Quahog Fishery
Sep. No. 177 - Preliminary Study of Correlation of pH and Quality of Shucked Pacific Oysters

Designations for fishery publications are interpreted as follows:

CFS - Current fishery statistics of the United States and Alaska.

SL - Statistical lists, consisting of lists of dealers of fishery products and manufacturers of byproducts.

FL - Fishery leaflets.

MDL - Market development lists of frozen food locker plants and locker associations.

Illustrator -- Shirley A. Briggs Compositors -- Jean Zalevsky and Norma C. Dressler

Processing -- Miscellaneous Service Division

FISHERY RESOURCES OF MICRONESIA

HAWAIIAN 14-FOOT THROW-NET -- TINIAN, MARIANAS

Local stocks of fish are adequate for subsistence of the Micronesian native population, using their traditional fishing methods. This is assuming that they receive ample quantities of hooks, twine, netting and other fishing supplies.

Tunas, especially the yellowfin (Neothunnus macropterus), skipjack (Euthynnus or Katsuwonus pelamis), albacore (Thunnus germo), and little tunny (Euthynnus alleteratus), are abundant enough to warrant the expectation of a fishery yielding in the neighborhood of 200,000,000 pounds annually if the problem of live bait supply can be solved.

Because of the destruction of Japanese shore facilities, a large initial investment would be required to establish a fishery. The most favorable locations would be at Koror in the Palaus, Truk, Ponape, and Saipan. These are recommended because they have reasonably good conditions with respect to living, communication, and labor supply, and there are known supplies of live bait.

Factory ships would have the important advantage of mobility but might find considerable difficulty in solving supply problems, particularly for fuel and fresh water.

Other exportable products of the area include trepang; trochus; black-lip pearl oyster and tortoise shells; cultured pearls; sponges and decorative shells including giant clams.

--Fishery Leaflet 239

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILD LIFE SERVICE
WASHINGTON 25, D. C.

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